THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. XCI. No. 2207.] LONDON, AUGUST 29, 1905. [57TH YEAR. PRICE 6d.

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— *ESTABLISHED 1830.* —

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OXIDE PAINTS, OILS, AND GENERAL STORES, FOR GAS AND WATER WORKS.

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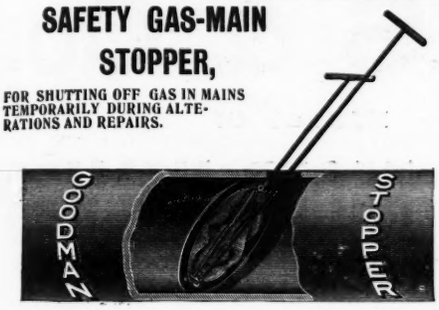
FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS.



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FOR GROUND USE FLUSH BOXES ETC. — HIGHLY SENSITIVE. LONG RANGE.

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Samples and Prices may be had on application.

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CHEAP STEAM PRODUCTION.

TO THE EDITOR OF ENGINEERING.

SIR,—Some years ago we attached forced draught and special fire-bars to our two Lancashire boilers, with the object of burning coke dust. The load has grown, and last week I had the water and fuel carefully checked, with the following results:—

Water used in boilers from Dec. 9 to Dec. 16, as per Corporation meter .	79,300		
Fuel used from Dec. 9 to Dec. 16: Coke	£	s.	d.
dust—41 tons 4 cwt., at 1s. 11d. .	3	19	0
Washed slack—15 tons 17 cwt., at 6s. 6d.	5	3	2
	£9	2	2

This works out at a fraction under 2s. 4d. per 1000 gallons. Can this result be beaten? I may add that the water-feed to the boilers is heated by the exhaust steam from the engines to 200 deg.

Yours truly,
C. D. LENG.

High Street, Sheffield, Dec. 19, 1904.

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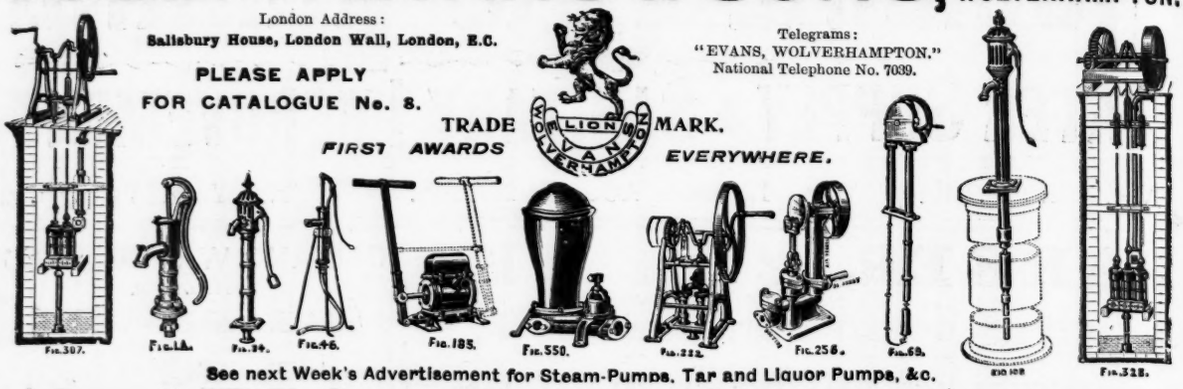

See next Week's Advertisement for Steam-Pumps, Tar and Liquor Pumps, &c.

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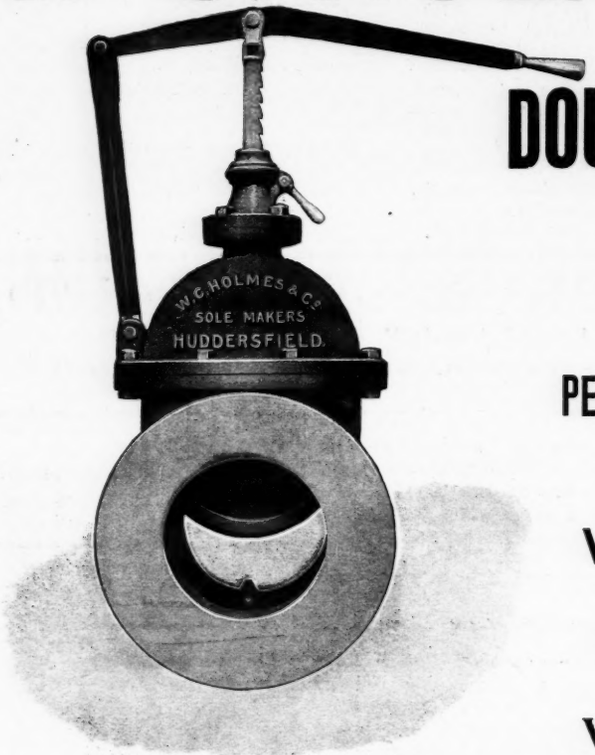

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BOILERS,
ENGINES,
PUMPS,
ROOFS,
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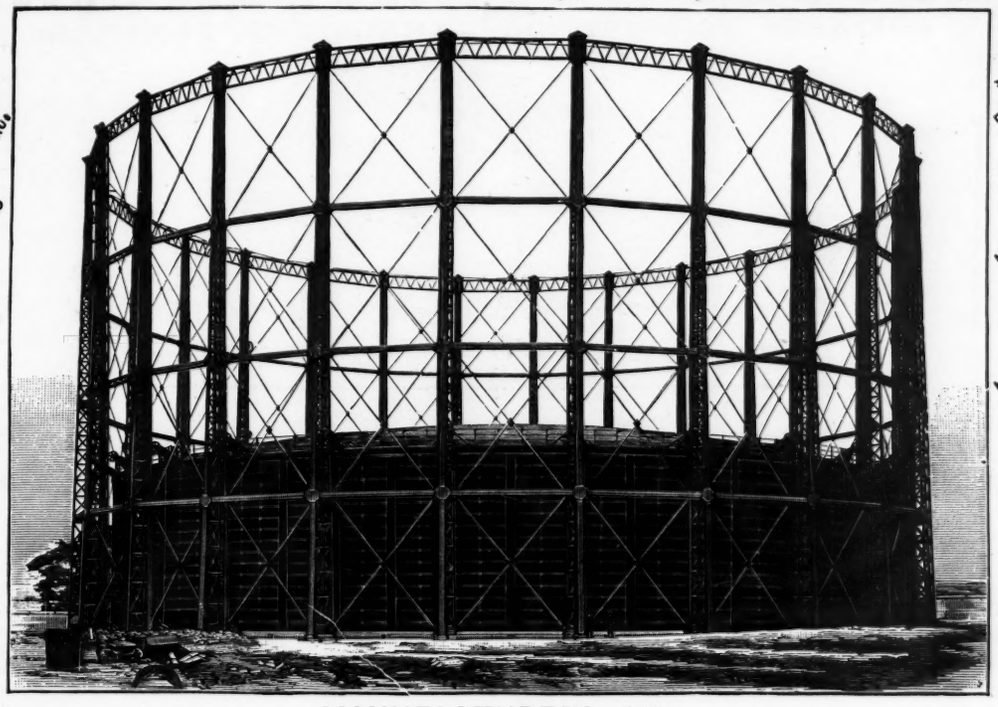

TELEGRAPHIC ADDRESS: ATLAS, BIRMINGHAM.

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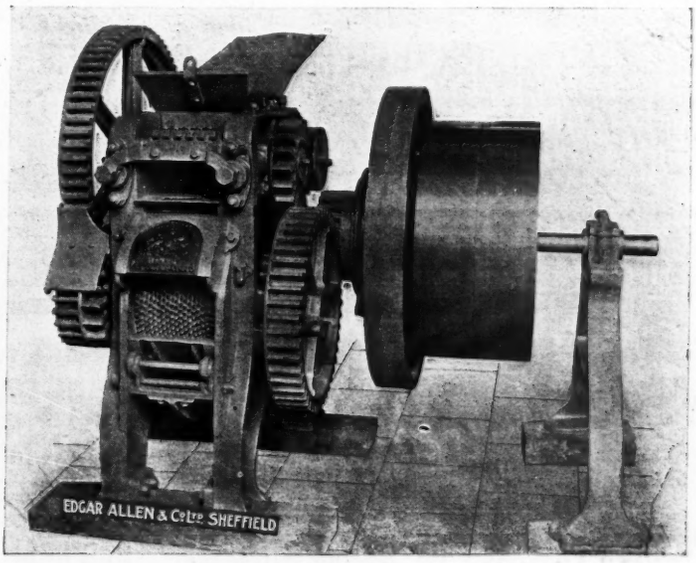

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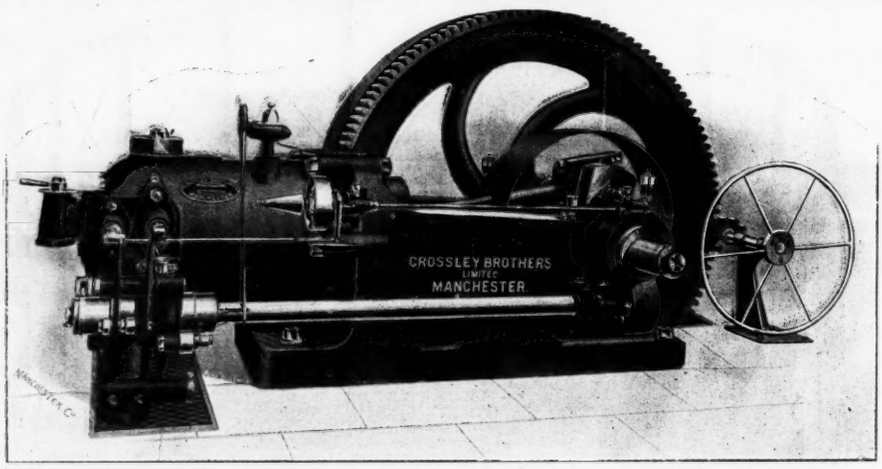

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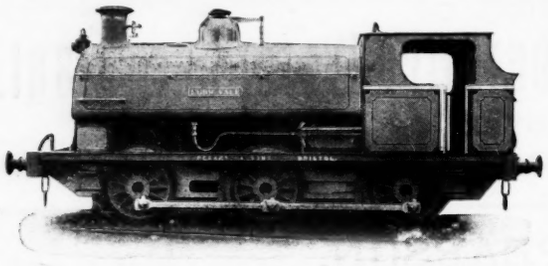

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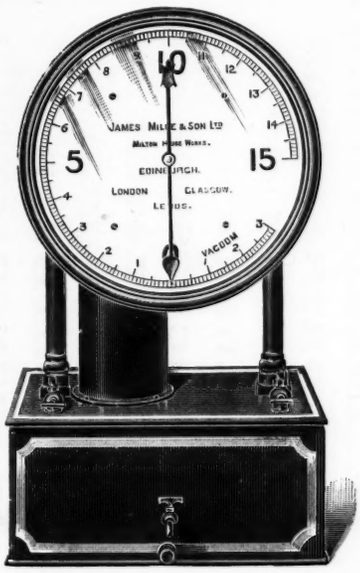
WITH LARGE DIALS

$11\frac{1}{2}$ & $16\frac{1}{2}$ inch diameter.



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Patent Automatic Machinery

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[See Illustrated Advertisement, Aug. 1, p. 290.]

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Fig. 35. 100 c.p.

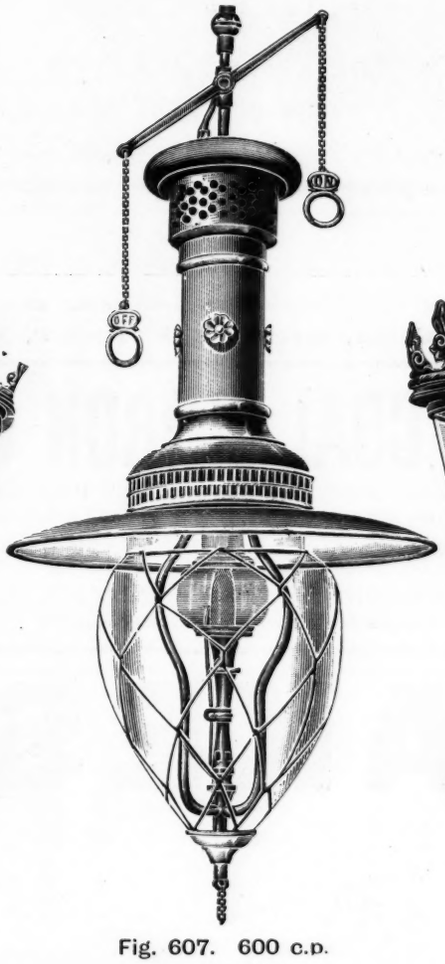

Fig. 607. 600 c.p.
Self-Intensifying.

Fig. 35a. 300 c.p.
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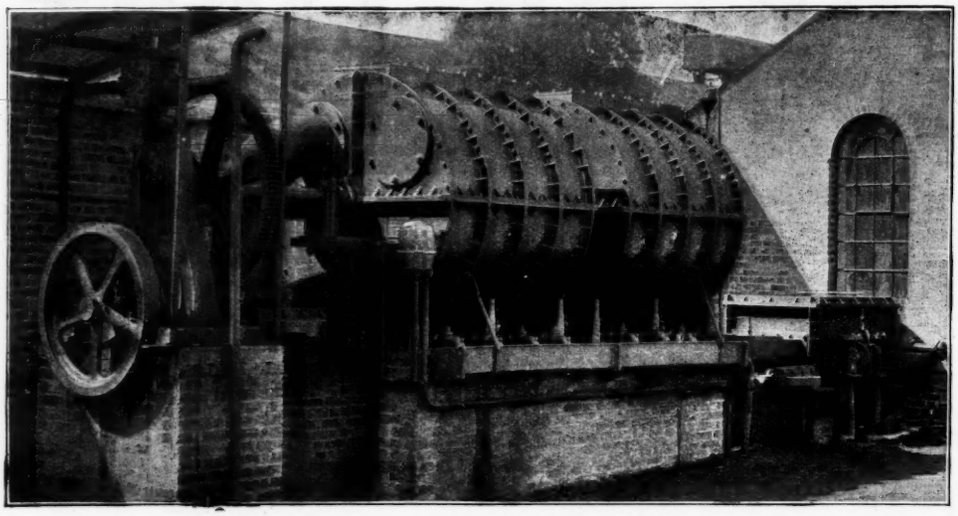

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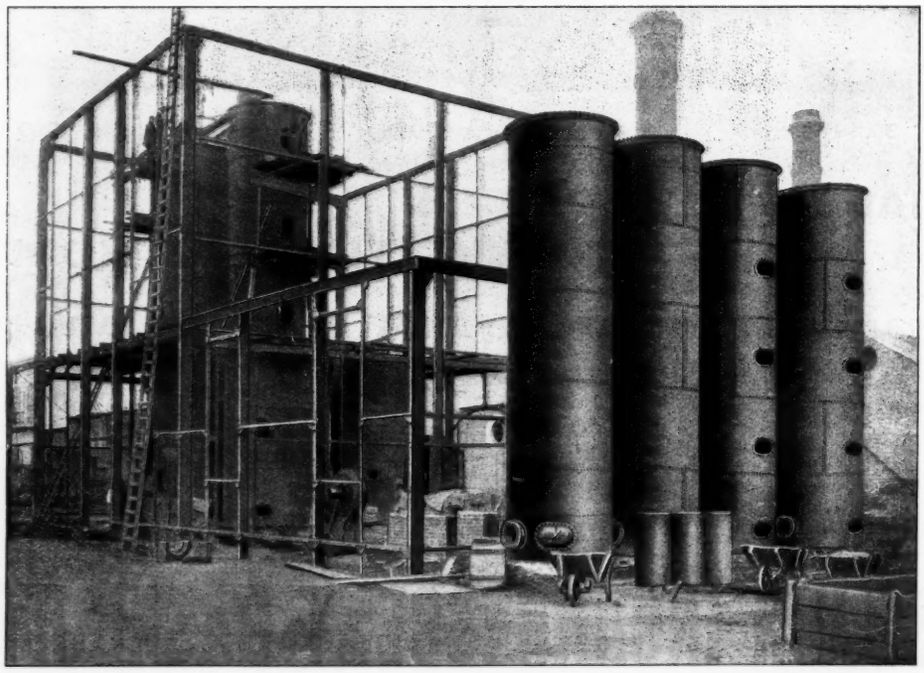

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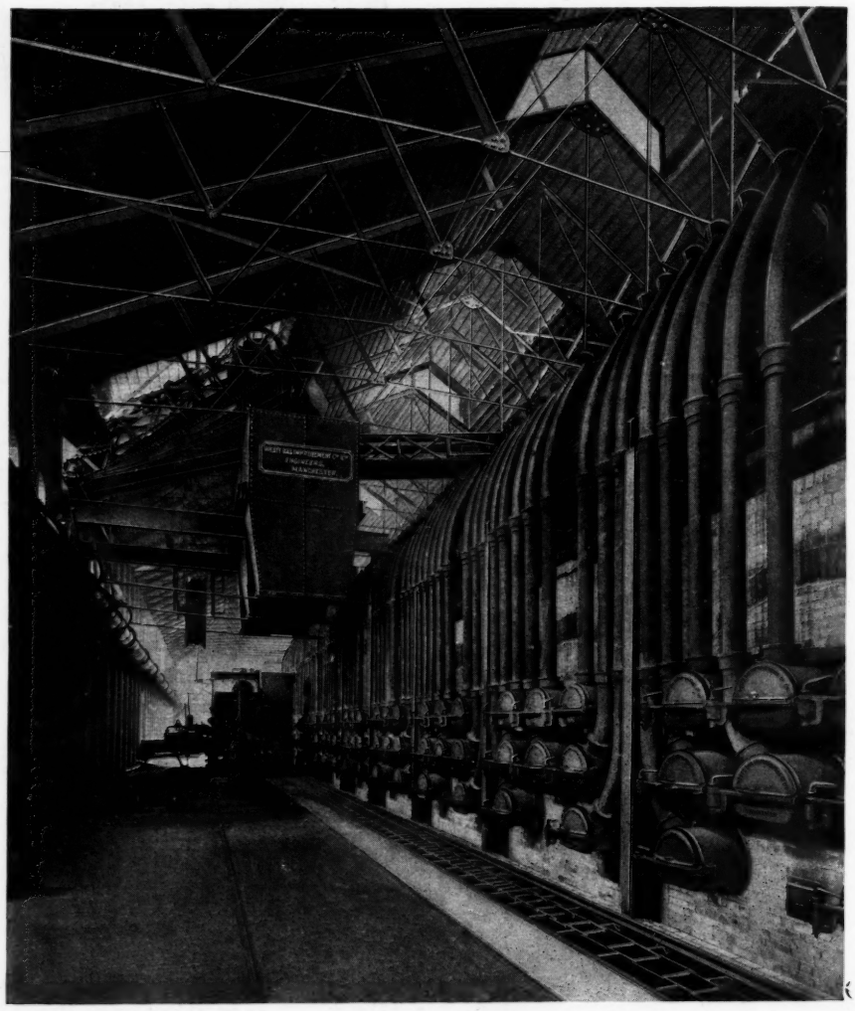

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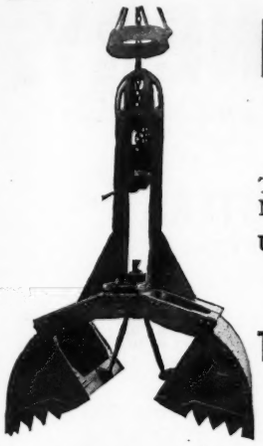

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APPLICABLE TO ANY ORDINARY SINGLE CHAIN CRANE.

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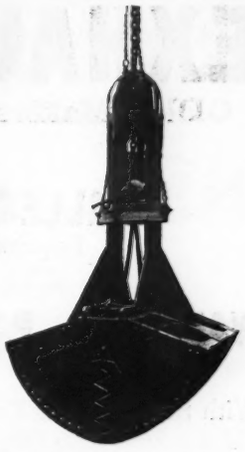

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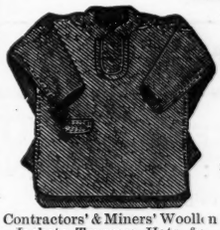

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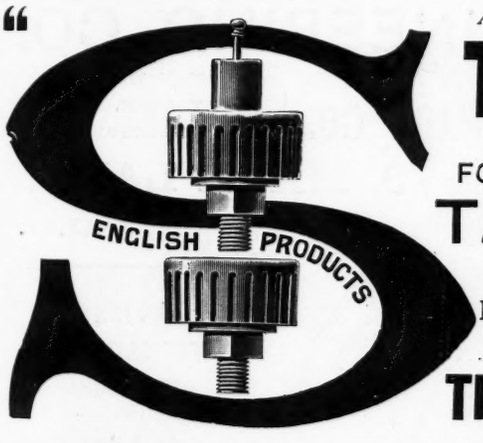

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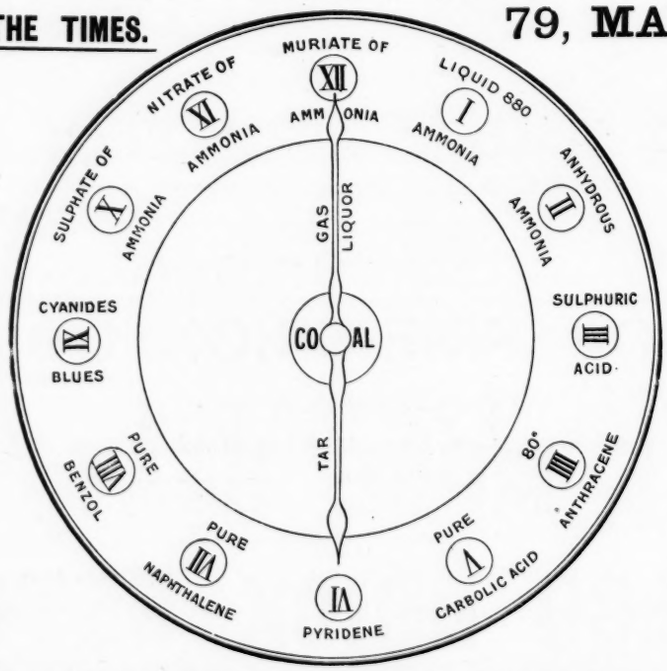

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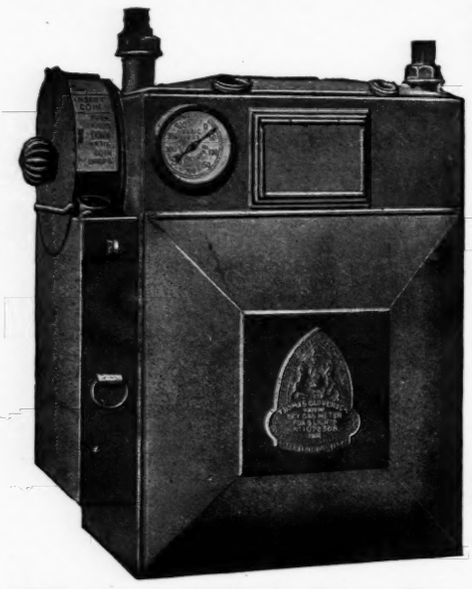

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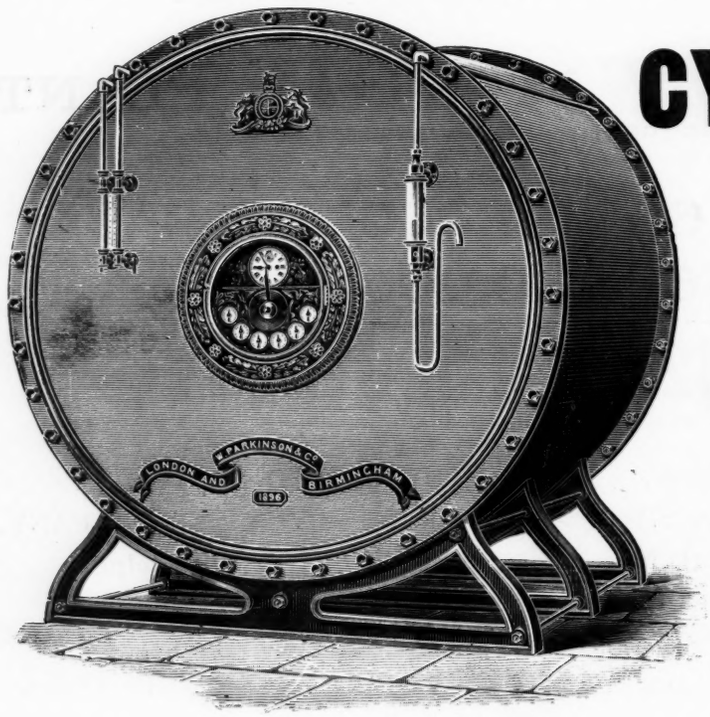

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EDITORIAL NOTES—GAS, &c.

Gasholder Capacity.

THE consideration of the proposition advanced by Mr. R. Bruce Anderson, at the meeting of the Irish Association—that the conventional 24 hours' maximum make of gas as the rule for the storage accommodation of a gas-works should be supplanted by one prescribing 60 per cent. of the maximum daily output—is somewhat hampered by the omission of information as to whether the proposal is intended to apply solely to the towns of Ireland, or is offered for general accceptance. As, however, there is no suggestion of restriction, it must be regarded from the general standpoint; and from that standpoint, the broader the consideration, the more reason is there found for retaining the old standard, and in cases even exceeding it. Mr. Anderson himself admits that the rule "has worked well in practice, "and its correctness may therefore be assumed." Upon that admission, one marvels somewhat why Mr. Anderson cannot "leave well alone;" and for the explanation we look through his paper, only to find that the foundation of his argument is almost an ideal condition of things, with regularity in the hours of consumption from day to day, men and settings all of unimpeachable character, and far-sighted managers who prevent instead of cure accidents. Under such circumstances, one is almost inclined to ask, Why does one trouble about storage at all? It is all very well to picture such theoretical conditions, and apply mathematical calculations to establish their truth. But the vagaries of winter and mishaps do not subject themselves to theoretical conditions or mathematical deductions. It may be conceded that in many small towns in Ireland 60 per cent. is, and will continue to be, sufficient storage; but the proposition is being considered as a general one, and the conditions are so variable that any general rule should err on the side of liberality rather than the contrary. It is true that in these days, and in numerous towns, the day-load is levelling up to the lighting load; and if circumstances continued normal, there would be sufficient reason for going part, if not the whole, of the way with Mr. Anderson. But in considering storage we have to have regard to the maximum day's consumption; and it is remarkable in many of the larger, medium-sized, and suburban towns how quickly in these times the maximum day is the maximum day no longer. Wherefore, we say, even if we could adduce no other reason, that Mr. Anderson is cutting things too fine when he offers for general acceptance the proposition that, considering variations in issue only, holders need be provided to store at the outside one-third of the maximum twenty-four hours' output, and the balance up to 60 per cent. as the margin.

Take, as an example, a large manufacturing town where, under normal circumstances, there is a large cooking and heating consumption in the day and demand for manufacturing purposes; and each year brings its increase. Without warning in the depth of winter, dense fogs arise, and throughout the day—perhaps days—the mains are being heavily drawn upon, in addition to ordinary day requirements, for manufactory, shop, domestic, and street lighting. For what will happen in the way of consumption, we commend to the notice of Mr. Anderson the figures published in the last number of the "JOURNAL" in 1904, and in the first number this year. From them, to illustrate our example, we will take those referring to Manchester. On Dec. 21, Manchester experienced its maximum day's consumption—26,819,000 cubic feet; the previous maximum having been 26,164,000 cubic feet. During the spell of foggy weather, the supply of gas had to be curtailed; and yet the storage capacity of the works was 24,500,000 cubic feet, or (say) 92 per cent. of the previous maximum day's output. What Manchester would have done during Thursday and Friday of that particular week, if 60 per cent. of the maximum day's make had been the extent of the storage, can well be left to the imagination of readers; and what is more, Manchester was not alone in this country in having to reduce its pressure. Take the Suburban Companies again. On the east side of London, the increments of business during the past few years have been ranging between (say) 8 and 20 odd per cent.; and with such increases a maximum day's demand is soon buried among the records of the past. During the fog at the end of last year, there were increases in consumption in one of the eastern suburban districts, on four consecutive days alone, of 11·85, 38·94, 25·56, and 12·47 per cent.; and at Croydon, as another example, Mr. Helps had on four days to deal with increases of 22·4, 18·9, 24·6, and 21·7 per cent. Such figures as these point to the necessity of the margin of safety being considerably extended rather than diminished. This is the very point that Mr. Corbet Woodall was insisting upon, at the last meeting of the Tottenham and Edmonton Company, when commenting on the greatly increased rates of increase in many parts that have not been uncommon in recent years. His caution was to the effect that there has been such a succession of mild winters that there is danger of the managements of gas undertakings counting upon a continuance of them, and be caught insufficiently prepared if a really severe winter came now. With such a winter, and the business increases of late, the former maximum day's consumption would be put very much in the shade. During last year's fogs, there were gas undertakings that, for the greater part of the week, found previous high records were being exceeded day by day; and such are the periods, together with severely cold weather, that have to be reckoned with in coming to a conclusion upon the question raised by Mr. Anderson. Nor must it be forgotten that the rapid growth in the number of private consumers whose normal consumption is comparatively small will also probably tend to upset previous calculations as to requirements during a rigorous winter. Mr. Anderson also ignores what we hope is a growing institution in gas-works, and that is Sunday rest for the workers, and in conjunction with it of the Saturday night consumption, and that constantly rising peak on the chart during the hours of cooking on Sunday. All have a bearing on his 60 per cent. rule.

For reasons and experiences such as those related, rather than relax the rule as suggested, most gas managers would prefer to see the margin, if anything, extended. The greater the consumption, the greater the responsibility; and Mr. Anderson's argument is that this greater responsibility should be accompanied by a reduction of the safeguard. The argument certainly is not cloaked in prudence. As Mr. Thomas Newbigging said away back in the seventies, and said again as recently as last year, abundant gasholder capacity tends to convenience and economy in manufacture. Other gas engineers have, in their writings and practice, adopted the rule that Mr. Newbigging has stood by during his professional life, and finds no sufficient reason to alter now. That rule gives the gas engineer greater freedom than would the 60 per cent. in the operation of his plant, and defends him and the consumers on occasion of grave, though happily rare, accident, that even Mr. Anderson's far-sighted manager could not prevent. Retort-settings cannot be heated up at a minute's notice; while a fog of long duration, or severely cold weather, may come without warning. Ample storage accommodation, even excess storage, is the bulwark of a gas-works and of its business; and, in view of latter-day consumption experiences, we are not convinced that Mr. Anderson has made out a case for any reduction of its recognized strength. His consideration of the question as well as this comment applies to gas-works without water-gas plant, though in two cases where there was shortage during the fogs last year, water-gas plant was in use.

Gas Poisoning and Domestic Gas-Fittings.

THOSE of our readers who have perused the paper that Dr. Henry Leffmann read before the Philadelphia County Medical Society, on the "Domestic Use of Illuminating "Gas," and the discussion thereon, which had place in two recent issues of the "JOURNAL," will have been forcibly reminded of the almost, if not quite, useless Home Office inquiry of a few years ago into the use of water gas in this country, which inquiry was incited by a few hysterical medical and scientific gentlemen who fancied that a new and terrible danger had arisen in our midst which would have very serious consequences. Time has largely eradicated the fears that were engendered. For our own part, we have consistently distinguished in discussion the two questions of economic advantage or otherwise and the supposed increased danger of distributing an admixture of coal and carburetted water gas containing a larger proportion of carbon monoxide than is found in gas made from most classes of coal. During the Home Office investigation, the agitators who sought to bridle by law (though in most cases restricted use was already being practised by gas suppliers of their own volition) the quantity of water gas distributed, laid much stress upon the increase of fatal gas-poisoning cases in America; little heed being paid, in making the comparisons, to the growth of population and gas consumption in that country, as well as to the considerable proportion of water gas distributed, which had no analogy in this country. If Dr. Leffmann's paper and the discussion had been in existence at the time, the Home Office Committee would also have heard that another condition obtains in America, if the evidence of three medical gentlemen and two Inspectors of the Fire Underwriters' Association of Philadelphia is to be relied upon, which has not any general analogy in this country, and that is in the methods which appear to be adopted in the matter of fitting up gas-stoves and other appliances, and which methods have laid to their charge a considerable share of the victims of leakages of gas containing large proportions of carburetted water gas.

To the title of the paper—"The Domestic Use of Illumi- "nating Gas," there was a sub-title: "Its Dangers and "the Means of Avoiding Them." And the whole means of avoidance might be summed up in the two words, "proper "fittings." Dr. Leffmann is unsparing in his criticism of the gas heating appliances and their connections with which his Philadelphian experience has brought him into contact; and he roundly condemns, as being the source of much grim mischief, the use of india-rubber tubing, and, where such tubing is employed, the use of a tap on the gas-stove itself. It certainly seems, from his statements and those of the contributors to the discussion, that there is a great deal of the makeshift order about the fitting up of gas heating-stoves and other like arrangements in America, such as would not be tolerated in this country, even with the comparatively small use that is made of water gas here. The author's impeachment of the fittings was echoed by Dr. Wadsworth, the Coroner's Physician for Philadelphia, and by the two previously mentioned Inspectors of the Fire Underwriters' Association—the former indicting defective fittings as being the "chief cause" of gas poisoning, and the latter accusing them of being a prolific cause of fires. What Dr. Leffmann prescribes as the means of avoiding danger of gas poisoning might almost have been copied from the practice of this country. It may interest our American friends to know that by all British gas authorities, the use of india-rubber tubing for connecting up gas-stoves is repudiated; and no gas man would now think of allowing a gas-fire to be fitted to the supply-pipe by such dangerous means. The majority of gas-stoves in use in this country are hired from the gas suppliers, and are properly fitted in position with metal—mostly iron or brass—connections; and those that are bought are, as a rule, set up in similar fashion either by the sellers of the stoves or the gas suppliers. Beyond this, all slot-meter installations are made by the gas suppliers or their contractors to specification and under proper supervision. Specification of fittings and supervision of fitting work are subjects on which opinion has veered round wonderfully since the coming of the slot meter; and many gas suppliers (who formerly feared any responsibility beyond the meter) now take permissive powers to these ends in their Acts of Parliament, and find them very useful. To the growing care that is exercised—preventing, as it does, shoddy, dangerous, and inefficient work—may no doubt be traced the comparative immunity that we in this country enjoy from poisoning by gas, other than through negligence or design. Comparisons, perhaps, are odious; but when what transpires in America under conditions there existing is used in evidence on this side against any branch of manufacture with pernicious intent, it is only fair to point out wherein there is incongruity between the conditions which annuls the application of the experience.

It follows that, where proper attention is given to the fittings, the question of the greater toxic property of water gas compared with coal gas loses, to a large extent, the importance it has where there is neglect, and the distribution of water gas exceeds in proportion, or has completely displaced, coal gas. But, this fair line of reasoning notwithstanding, we learn from Dr. Coplin, in the discussion, that one very important point in connection with gas poisoning, especially with carbon monoxide, is "the form of intoxica- "tion which has been much more observed in Europe, and "with which we have very much less experience in "America." This is distinctly entertaining. In view of the smallness of water-gas distribution in Europe as compared with America, and the light that the paper and the discussion threw on the question of the danger of makeshift gas-fittings in the latter country, one might reasonably have expected that Dr. Coplin would have had ample opportunity nearer home for making observations on the particular "form "of intoxication" to which he refers. But the learned Doctor in his remarks indulged in some wonderful flights into theory and hypothesis, and established nothing. He stops, as it were, on the boundary just where we should have liked him to proceed into the region of fact. On the other hand, the author and the contributors to the discussion approached their subject in a practical frame of mind. The author and Dr. Wadsworth had good words to say for coal gas, in respect of its toxic effects, as compared with water gas; but in considering what they both advanced concerning the latter, there must always be kept in mind their allegations as to the responsibility of defective fittings. Whether the assertions of the medical gentlemen and the fire inspectors on this score have any foundation in fact, we must, of course, leave to our gas friends in America. If they have not, then there is ground for righteous indignation; if they have, then there is work at hand for immediate attention in the interests of the American gas industry. Let all bear these words in mind: "Gas is only dangerous when we lose "sight of its composition and effects. Its advantages in "the household are great. Properly used, it makes for "sanitation instead of against it." So wrote the author of the paper; and therefore they may be regarded as the accepted beliefs of a member of the medical profession.

Public Appraisement of Gas Stocks.

THE market position of gas stocks and shares to-day shows how deeply rooted in public favour they have become during the past year. If our weekly list of prices is contrasted with any one of the lists of about twelve months ago, the two columns headed "Closing Prices" and "Yield upon "Investment" will exhibit at a glance that there has been, almost all round, a considerable appreciation of values; while the yields, in most instances, have, as a result of this and nothing more, had a relative decline. For such a high appraisement of gas stocks on the part of the public, there must be some reason; but it cannot be found in the revenue returns for the last six months. Generally speaking, the net profit has been insufficient to pay dividends without falling back on the carry-over; and this is due to the influence of an indulgent winter to humanity, if not to gas suppliers as such, to the further reduced consumption owing to the growing use of the incandescent burner, to pretty general concessions in price to consumers, and to the break in residuals, but chiefly in the coke market. Yet people have the magnificent confidence that we find reflected by the much higher prices than those that ruled for gas stocks a year ago—British, colonial, foreign—and, having regard to the yields of some of them, there is further room for advancement. Several gas stocks are still (considering the amount of return on the investment and other points that should make the stocks acceptable to investors) under a fair value in comparison with others commanding better figures. It is also observed that there are stocks which formerly stood at absurdly low prices that have improved with the renewed esteem of the public; and the Directors

of some of these Companies are looking to obtaining better premiums on new issues than they have done for a long time past. Seeing that the publication of the half-year's accounts has not affected the upward tendency, such Directors have good ground for hope. The recessions in revenue have only been due to those fluctuations that come of general depression in trade, and atmospherical conditions that are incongruous with high gas consumptions. The public are apparently fully cognizant that such decline is but of a temporary order; and they are well persuaded by long experience that these fluctuations can, through solid balances and reserves accumulated in the good years, be met, and a steady dividend maintained.

Unquestionably, the Gas Exhibition at Earl's Court at the end of last year had a no insignificant part in creating the firmness in gas stocks; and the demonstration of what gas could do must have bestirred interest anew in a commodity which, compared with its competitors, has such a wide range of utility. No other lighting agent can claim so much usefulness—lighting, cooking, heating, power, and a hundred-and-one applications in industrial operations; and no other lighting agent can claim such general employment from palace to cottage. From the awakening of public authorities, too, to the expensiveness of electric lighting for street purposes, and the public knowledge of the greater expense incurred in domestic lighting when electricity is adopted, advantage has accrued to the gas industry. For the gas investor also the fact that in the manufacture of gas the residuals are all marketable, and substantially contribute to the revenue from the several branches of the gas business, has its attraction. It is on such grounds as these that we must set the present public favour towards gas stocks, in face of the decreases from various revenue sources of the past half year. The opening words of a review of the Metropolitan gas accounts in the "Financial News" on Monday last week were: "The gas industry, though "frequently threatened by the introduction of other methods "of illumination, has never failed to give a good return "upon the capital in it." The closing words were: "A "return of from 4½ to 5 per cent. on so steady a class of "security constitutes gas stocks an attractive investment, "in which there is still a margin for improvement in capital "value." To this we can fully subscribe. With, too, increasing economies in manufacture and the march towards a grade of gas that will be more in consonance with its varied uses, there will be still greater developments in business; and therefore the investor may be well assured that his present confidence in an industry whose vitality, we know, is stronger than ever, is safely founded.

A Trades Union Civil War.

There is at the present time what is very naturally regarded by the Labour leaders as an awful state of affairs in existence in connection with a strike at the Llanelly Steel Works; and though we are unable to regard the matter in so serious a light, the circumstances are peculiar enough to attract attention. In the first place, our old friends the Gas Workers and General Labourers' Union are to be found taking the "leading part;" while on the other side are the Steel Smelters' Union and the Steel Company—the latter Union being the only one which the Company now consent to recognize. The Gas Workers' Union are fighting against the refusal to recognize them; but in this, of course, there is nothing new, for many of the big industrial struggles have had a similar origin. The novel element is supplied by the Smelters' Union, who appear to be endowed with an amount of common sense which is not usually displayed in connection with the operations of such organizations. The real trouble dates from two or three years back, when the firemen in the district were agitating for shorter hours and better conditions of labour—a movement which, it might be remarked, was unsuccessful. When the time for coming out arrived, the firemen were informed by the management of the steel works, that Mr. Hodge, the General Secretary of the Steel Smelters' Union, had wired to them stating that, whatever the firemen did, the works were not going to stop. Since that time, the Gas Workers' Union have not received any recognition from the Steel Company, who wisely prefer to treat only with an organization which apparently fully realizes the importance of work to the working man; and though it is this refusal to recognize them which is the nominal cause of the struggle, it is easy to see that the real bitterness is against the Smelters' Union, who have, on occasion, so effectually put a spoke in their wheel. Since the strike, free labour has been employed at the steel works; and in addition to this, there is, of course, what is termed "the awful sight" of one Union remaining at work while another is on strike in the same place. Thus we have the curious combination of a Union fighting another Union, and of Unionists working peacefully alongside of free labourers. Under such circumstances, a strike cannot be aught but a "forlorn hope;" and as the only chance of success would seem to lie in inducing those at work to join the strikers, it is not surprising to learn that a large number of men have been committed for trial for intimidation. For the Labour leaders at least the business is a serious one; and therefore it is perhaps only natural to find them indulging in a more than usual amount of extravagant language—and some worn-out absurdities. For instance, the men are once more being told that the interests of employers and workmen are not identical, and that no power under heaven will bring their respective interests into harmony. We know that there is a means by which the interests of the two parties to the labour contract can be made absolutely identical, even if they are not so under the generally prevailing order of things. But so that the argument advanced by Mr. O'Grady to the Llanelly workers may be thoroughly understood, we will reproduce it in his own words: "It is the bed-rock principle of a Trades Union that if there is a certain amount to sell, it is the duty of every man who works by the sweat of his brow to sell it at the highest price and under the best conditions; and the only way to avoid underselling is to work in unison. What is the principle of the employer? It is to get the labour as cheap as possible; and the reason of this is that it will mean larger profits—profits which he will spend largely and viciously, and at the same time acting the part of the social butterfly. While workmen are labouring in the bowels of the earth, with the mouths of death open in almost every crevice of the grimy mines, and while their wives and children live in daily fear, their employers are away in Continental hells, travelling and indulging in vulgar ostentation." In such phrases as these is it sought to induce working men to quarrel with the capital which, in one form or other, is absolutely necessary to their welfare. We hold no brief for the masters; but of this we are assured—that working men will derive more lasting good from the cultivation of a friendly feeling with their employers than will ever grow out of the attempts of the Unions to stir up strife and hatred. Can it be that the civil war in which the Unions at Llanelly have engaged is the beginning of the end of this kind of rule of the Labour leaders which has so disturbed the industrial work of the country of recent years?

Croydon Prosperity—Domestic Use of Coke.

Full of point were the proceedings at the meeting of the Croydon Gas Company last Friday; and readers generally will find within the address of the Chairman (Mr. Charles Hussey) and the remarks of Mr. Corbet Woodall matter that will not fail to interest and instruct. The course of the Company's business latterly has been that of other prosperous gas undertakings. They have had the common reverses, and have met them philosophically, knowing that it is only a question of yielding to the times. And, besides, bounding increases in new connections (as here experienced) have great influence in strengthening one's faith in a business undertaking of this kind. In addition to the new accounts recently opened, the prospect is that in future there will be not only no abatement but great extension of the gas business at Croydon, and for several reasons. The price of gas has been reduced in the Carshalton area, and discounts have been revised to the advantage of consumers for power and other purposes demanding a large use. With the amalgamation with the Caterham Company, the area of the Croydon Company has been considerably extended; and not only will benefit accrue from the open door that it has given the Company to the expanding of their business by the aid of cheaper gas than obtained in that district before, but the weal of the consumers, both old and new, will be contributed to by the concentration of management and manufacture. Surveying the position generally at Croydon, we cannot help saying that the prospects are most encouraging, and that they have been enhanced, in no small degree, by the extension of territory effected by the absorption some time since of Carshalton and

now of Caterham. Fresh steps that are being taken, and are referred to in the succeeding paragraph, to cultivate new business will no doubt also have effect. The decline in the coke market induced Mr. Hussey to comment upon the question of the use of coke for domestic purposes; and he suggested that the proprietors might test for themselves the economy to be effected by the admixture of coke and coal for heating purposes, and get their friends to do the same. There is no question that, generally speaking, gas undertakings have not so seriously cultivated as they might the domestic use of coke. The gas-cooker and the gas-fire stand largely in the way; and there are few managers who would care to work up the coke fuel business to the detriment of the gas-cooker and fire branches. There are, however, such a large number of inhabitants in a district who will not be persuaded that the ways of their fathers were wasteful, and that their methods of heating entail in these days unnecessary labour and dirt, that there should be abundant opportunities, where gas cookers and fires cannot be placed, for implanting knowledge as to what coke can do. Mr. Woodall confessed that in this matter the Croydon Company have not perhaps done all they might have done. We are afraid they are not solitary in this matter; and the reasons are obvious. The appliances used for domestic fires are, in Mr. Woodall's opinion, elementary and poor; but still he thinks something could be achieved to bring before the public more suitable stoves for the purpose of using coke in the home. Special stoves for coke have been on the market a long time; but they are not reported by sellers to be a good line, though perhaps not on account of efficiency. There is an imposing difficulty. Householders require a heart-breaking amount of perseverance expended upon them before they can be convinced of such a thing as that it will pay them to discard their present grates and purchase new, just for the purpose of using a gas company's coke; and there would be so much uncertainty about the business that a company could not well afford to hire out special stoves for the purpose. However, Mr. Woodall has practically made a promise to the proprietors of the Croydon Company in this connection; and it will be interesting by-and-by to learn what the Company have done—and the result.

Agency Terms for Ironmongers.

The incipient steps to effect the bridging of the gulf that has been widening between ironmongers and gas undertakings, have been taken by the Croydon Gas Company. There can be no contention over the fact that ironmongers and gas-fitters largely lost the business in gas appliances and fitting through their own original indolence and want of enterprise; and now that they have seen what the business has grown to, naturally they desire to have a hand in it. Of course, their interest is a single one—immediate profit; while the gas undertaking has a double interest, and for the business done in the one direction they can afford to cut things fine in the other. The ironmongers and gas-fitters cannot well complain of this where gas companies are concerned; but one can, in their days of repentance, feel a certain amount of sympathy with them when the gas suppliers are a municipal authority, and the tradesmen ratepayers. But there is no substantial reason why local ironmongers and gas-fitters should not be established as agents for gas suppliers on such lines as those laid down at Croydon, which project by the way is an issue of the interview a deputation of ironmongers had with the Institution Advisory Committee at the Earl's Court Exhibition. The Croydon area of supply is an extensive one; and if every ironmonger's and gas fitter's place of business is constituted an agency for the sale of gas appliances, with the Gas Company's office and show-rooms as the base, it does not need argument to show that such a mutual arrangement may be productive of much good for the Company, and at the same time heal the wounded feelings of the tradesmen on the point of unfair competition. With electricity in such active mood, it is undoubtedly better to have the hands of these tradesmen for rather than against a gas undertaking. The foundation of the agreement between the parties was stated in last week's issue (p. 514); and it may be taken that the conditions there set forth are practically those that will finally come into operation. There is only one point about the agreement that perhaps might be considered. It is that, in cases where the fixing of appliances sold or hired under this agreement is performed by the tradesman concerned, the Company should retain to themselves a right of inspection of the finished work. The connection of tradesman and Company under this agreement may make such protection on the Company's part desirable. Otherwise we do not think, until there has been experience, that there is room for much improvement in these arrangements, which appear to be most comprehensive.

Street Lighting in Croydon

Only one other point from Mr. Hussey's address, and that has reference to the street lighting question in the borough, which is a subject that was referred to in "Electric Lighting Memoranda" on the 15th inst. The Electric Lighting Committee, because they are of the Corporation, seem to desire to have things all their own way without giving anyone else a chance. They were asked to report as to means for producing economy in the lighting of the streets, the cost of which has jumped up alarmingly since the electric arcs were introduced. For reply, they knock off £1 from the £18 charged for each arc lamp, and in return for such doubtful generosity hold out their hands for a further portion of the borough to light at a cost of a little under £500 per mile, as against £55 by gas, which is a point the Committee carefully overlooked in their report. What the Committee, as part guardians of the public purse, should have done was to confess to failure, and acknowledge that the greatest economy could be effected by returning to gas where electric arcs are standing, and thus save £3738 a year to the ratepayers, which would represent a penny rate. Instead of this they desire to unburden the ratepayers of more of their cash, in order that there may be a greater compulsory support of the electricity undertaking. But that is not all, the Corporation (owners of the electricity undertaking), instigated in all probability by the Electric Lighting Committee, have been most anxious to curtail the liberty of the Gas Company in making contracts. In the Company's last Act of Parliament, the Corporation secured a clause limiting the Company's powers of giving special terms to 20 per cent., on (as Mr. Hussey put it) the grounds of fair competition, while their rates of charge to different consumers for electric current show variations up to as much as 60 or 70 per cent. This is municipal justice, and a further example of how, being in authority, a Corporation confer upon themselves preferential treatment. In the borough, the Gas Company pay rates to the extent of £6600; and therefore they look at the matter from two points of view. When the Council meet again, an attempt is going to be made to get them to accept from the Gas Company a report with a full statement as to the cost of lighting the borough; and virtually this will be the reply to the Electric Lighting Committee's report. The South Suburban Company, we believe, will also be taking action on similar lines, as part of the borough is within their district. If we mistake not, the Croydon public lighting question—fair play being given—is going to develop into an interesting discussion. The electrical papers have already pronounced an ample benediction on the report; and have accepted it as conclusive proof that street lighting by electric flame arcs is the cheapest possible when worked out to the fifth place of decimals per candle power per hour or per candle power per annum, and based on chimerical and not effective candle powers. But all such trifling with a serious question for the ratepayers cannot upset the one solid fact that for 428 arc lamps and 90 Nernst and incandescent electric lamps, the cost amounts to £7500; while the rest of the borough is lighted by 2137 incandescent lamps at a cost of £7062. The electric arcs are only 65 yards apart; while the incandescent gas lamps are 80 yards—the respective prices being (as stated above) £500 and £55 per mile. And the people, who after all are the best judges, are asking what advantage they are getting from the additional amount they have to pay for lighting by electricity. Why do they question the matter, if the report is true?

Co-Partnership in the Gas Industry.

At the opening ceremony in connection with the annual festival of the Labour Co-Partnership Association at the Crystal Palace last week, the proceedings at which are noticed in another portion of the "JOURNAL," there was present one who must have regarded the gathering with feelings of considerable satisfaction. He was one of a small group of ardent men who associated themselves with Frederick Denison Maurice, as far back as 1848, in an earnest endeavour to improve the position of working men

socially and intellectually. Of that little band—they were called Christian Socialists at the time, and were regarded by some people as dangerous—a few, in the words of the Apostle, "remain unto this present," but the rest are "fallen asleep." One of the survivors is Mr. J. M. Ludlow, C.B., and as he listened to the report on the progress of the Association, his thoughts must have gone back to the time when he and his co-workers made such strenuous, but unhappily ineffectual, efforts to place co-operation upon a permanent basis. If he had then been asked what were the chances of the principle of co-operation being adopted to the extent shown by the report referred to, he would probably have replied that they were very remote. Yet co-operative societies now in existence have a membership of nearly 2¼ millions, and feed and clothe one-seventh of the population of the British Isles. Similarly, if a reader of the "JOURNAL" half-a-century ago had had it suggested to him that its columns would some day be occupied with records of the adoption and progress of the system of co-partnership in the gas industry, he would have regarded the suggestion as too visionary to be seriously entertained. Yet this has come about in the process of time, owing in the main to the changed relations of capital and labour. The capitalist, with his millions and his forests of timber, is powerless to turn them to profitable account without the co-operation of labour; and labour is equally powerless without the help of capital. The recognition of the absolute dependence of one upon the other has led to the adoption of collaboration, on terms mutually equitable, in place of the distrust and hostility with which formerly each regarded the other. The Labour Co-Partnership Association, as its President pointed out in his address last Thursday, have promoted a system which enables the worker to occupy a high place in the industrial community "by sharing the profits of industry, and taking an intelligent part in its responsibilities"—a system which, in fact, makes him a partner instead of a mere wage-earner. One of the speakers in the discussion of the report was Mr. H. Austin, a Workman-Director of the South Metropolitan Gas Company, who gave particulars of the working of the co-partnership scheme in that great undertaking. With these, most of our readers are familiar. It is gratifying to reflect that other gas companies have already adopted the system; and it is to be hoped that the number may be increased in the not distant future.

Making Electric Lighting "Pay."

A member of the Barnstaple Town Council tersely and caustically summed up last week the objections which are so widely and justly held to the municipal control of electric light undertakings. Any business, he said, might be made to pay if they could manufacture at their own price, charge what they like, and find an unlimited market, such as the Corporation had in connection with the public lighting. There is nothing simpler. Anyone would be able to make profit out of anything if he could only sell enough of it at a sufficiently high price. There are plenty of cases where municipal electric light "profit" owes its existence solely to the exorbitant charge for lighting the public thoroughfares and buildings. The fact that the ratepayers pay in this way for the luxury of allowing their representatives to run municipal undertakings is not always apparent. It is admitted that at Barnstaple the lighting has been improved; but as the cost of it is put at the equivalent of gas at 9s. per 1000 cubic feet, this is not to be wondered at. It is also worthy of note that since the year 1902 the rates in the town have increased from 4s. 10d. to 6s. 7d. in the pound, or an addition of 1s. 9d. How far the two things coincide we do not know; but it is quite evident that municipal enterprise, as represented by the electric light works, has not done much as yet to cheapen the cost of living in Barnstaple.

Petroleum Production.

It is some time since we have had any direct authentic information as to the position of the oil market, which claims the perennial attention of those gas makers who are in possession of carburetted water-gas plants. This is not a market in which supply and demand always govern prices, owing to other and more despotic influences. If supply and demand were the sole ruling factors, then, unless the latter has enormously extended, the price should now be at a very reasonable figure; seeing that official returns as to the output last year indicate a considerable increase on that for 1903. The United States Geological Survey have issued their statistics as to the production of crude petroleu in the States. These show that the output in 1904 amounted to 117,063,421 barrels, valued at $101,170,466, compared with 100,461,337 barrels, valued at $94,694,050, in 1903. The average value of the oil per barrel fell from $0·94 in 1903 to $0·86 in 1904—a decline of 8 c. per barrel. The output in California was 28,400,000 barrels—being an increase of 10,400,000 barrels on the production of 1903. At the present time, there are no less than 2700 producing wells in the southern part of the State. These latter figures are from the British Vice-Consul at Los Angeles; and he says that the city has practically discarded the use of coal—gas both for illumination and fuel being now made wholly from oil. Turning to Roumania, the British Vice-Consul at Galatz reports that official statistics place the 1904 output at 497,000 tons; the monthly averages in the second half of the year showing a large increase on the first half—viz., 45,635 tons, as against 37,176 tons. The number of hand wells has increased, owing to their small cost. There were 744 wells in 1904, against 675 in 1903; and those in process of sinking 195, against 163. On the other hand, the number of productive borings appears to have decreased; the figures being 290 for 1903, against 224 in 1904. The borings under drill have, however, risen from 114 to 192. The activity of Germany in finding profitable employment for capital in industries of other countries—a matter referred to in an editorial article recently—crops up again here. In fact, the part played by German capital during the year is referred to as being one of "the most noteworthy events in the history of the petroleum industry" of Roumania; the money which found its way through three German banks being the means by which new companies were formed and old ones supported. The Standard Oil Company have also now got their finger in the Roumanian pie; for the most important of the Companies formed last year is one working under the name of the Româna-Americana, which may, on the authority of the British Vice-Consul, be translated as "Standard Oil Company." Several years since, they tried to get from the Roumanian Government the concessions of the State properties. But they were unable to come to an agreement, and are now working private concessions. Of course, we are not assuming, in drawing attention to these statistics, that the petroleum productions referred to are anything like wholly suitable to the purposes of the gas maker; but an all-round increased production of a commodity, under ordinary conditions, has some bearing on market values. The oil market, however, moves in a mysterious way—not in obedience to any general commercial law, but largely in compliance with the arbitrary will of those who dominate it.

The Inventor of Gas Lighting.

The fact that the present year is the centenary of the introduction of gas lighting in the Manchester district has led to a revival of the controversy as to who, among numerous pioneers, is entitled to the honour of being described as the inventor or discoverer of gas lighting. In this country, Murdoch's supremacy is practically unchallenged, in spite of the claims put forward in Cornwall on behalf of some obscure individual named Hornblower, who is said to have used gas for lighting his millwright's shop long before Murdoch had introduced it into his house at Redruth. But it is not so abroad. In France, as our readers are aware, a claim to priority of invention is put forward on behalf of Lebon; and in Belgium Jan Pieter Minckelers is held to have been the discoverer of the illuminating properties of "inflammable air," the products of the distillation of coal and other substances. Minckelers is said to have lighted his lecture-room at the Belgium University at Louvain with gas as early as 1785, or seven years before Murdoch adopted the same method of illumination at Redruth. All this is historically interesting, and is evidence of the fact that at that period many men were working more or less consciously in the same field and towards the same end. A hundred years ago the use of gas was practically restricted to the place of its origin. A visit to Birmingham in 1805 by one of the partners in a Manchester cotton spinning firm led to gas being introduced in the lighting of the mill. Once introduced, gas lighting made steady headway; but it was not until 1817 that Manchester had its first gas-works, and even then, and for long afterwards, gas had to meet much prejudiced opposition.

The death occurred on Saturday of the Mayor of Burslem, Mr. Thomas Hulme, J.P., who was once a partner of the late Mr. William Woodall, M.P.

It is definitely announced that Mr. John Aird, son of the retiring member, Sir John Aird, Bart., M.P., will contest North Paddington, as a Conservative, at the next General Election.

HIGH RATES AND THE REMEDY.

At all meetings of public companies in these days there is one topic which is certain to receive some notice. The everlasting question of rating, as Sir George Livesey calls it, crops up everywhere. It affects all industrial concerns alike. Some get hit a little harder than others; but all have reason to complain that the rates have increased, are increasing, and are likely to continue to increase. It is true that the burden of the taxes is not light, and that at least twice in the year—when the income-tax collector calls, and when the Budget is under consideration and no prospect of relief is unfolded—most of us groan under it. But the taxes do not command anything like the same amount of attention as the rates. Taxes may be heavy; but they do not show, like the rates, a tendency to continually increase. In the boroughs and the counties alike the local authorities are heaping Ossa upon Pelion—screwing up assessments to the utmost limit, and adding to the poundage of the rates in a manner which is really astounding.

It was pointed out at the half-yearly general meeting of the Great Western Railway Company the other day that the amount paid for rates and taxes is equal to 2 per cent. on the capital of the Company. In the case of the South Metropolitan Gas Company, the increase in the rates last year was no less than 14 per cent. Gas companies and railway companies are in this matter fellow sufferers. They have not only to share with all other ratepayers the burden of the high rates, but they have the mortification of knowing that the local authorities, whose reckless extravagance renders high rates necessary, are direct rivals with them in business. While the railway companies are paying in rates a sum equal roughly to one-half the amount which the shareholders receive in dividends, they are fighting for their lives against the opposition of the municipal tramways. So it is with the gas companies, who have to meet the competition of the municipal electric light undertakings, carried on too often in such a manner as to suggest that their object is less to serve the public than to injure the gas companies.

But whether for gas and railway companies or for other industrial enterprises, this question of the growth of the rates is one of the utmost importance. Most important of all is to know how it is to be checked. If the poundage of the Metropolitan rates is to continue to increase in such proportion as will double the amount of the rates in seven years, it is obvious that a very serious crisis is not distant. Probably this ratio of increase will not be maintained. But if it were, the municipalities would, as Sir George Livesey said, soon come to the end of their tether and be forced to halt. That there is hope of reduced rates under existing circumstances we, however, find it difficult to believe. Before a check can be put upon municipal extravagance, there must be a radical change in the sentiments, not only of the municipal authorities but of Parliament. Instead of continually imposing on municipal authorities new duties demanding the expenditure of more money, Parliament will have to take means to place a check upon some of the enterprises in which these authorities indulge. As to the corporations themselves, they need to learn an entirely new lesson—new to them as corporations, although individually most of the members no doubt constantly practise it. They must, in a word, learn to cut their coat according to their cloth.

It has always seemed one of the most remarkable things in connection with the management of municipal matters that men who in the ordinary affairs of life, and in connection with their own business, display prudence and acumen, no sooner become members of local bodies than they throw these qualities to the winds. The same thing is to be noticed in the House of Commons. Day after day of parliamentary time is wasted in the discussion of trivialities and the wearisome reiteration of arguments with which everyone is familiar; while in the last days of the session, when time presses, millions are voted with a profusion which would be amazing if it did not occur year after year. One of the faults of municipal management, and the real cause of the rise in the rates, is that it seldom endeavours to adapt its expenditure to its income. Proposals involving the spending of large sums of money are put forward by committees, perhaps on the initiation of one or two members with whom they are hobbies, and are either rushed through the councils without any real consideration of where the money is to come from or the effect which they will have upon the rates. Instead of considering whether the community can afford this or that, committees are often engaged in a sort of rivalry as to which can spend most. It seems to be supposed that the importance of a committee is to be measured by the money which it can spend; each committee is more or less jealous of the other committees. When their efforts have resulted in the piling up of an expenditure which means an increase of the rates, it is practically impossible to induce any one of them to curtail its outlay. Such a lack of system is as opposed to efficiency as it is to economy.

If each municipal authority could formulate for itself a definite public policy conceived with regard to what it could afford, there would be an immediate prospect of reduced rates. It would, however, have to consider not only what it could afford to spend, but what it could afford to borrow. Much has been said from time to time about the increase in local indebtedness, and more than one Chancellor of the Exchequer has uttered words of solemn warning to the local authorities about the obligations which they are incurring with such apparent recklessness. These warnings have, however, hitherto fallen on deaf ears, and probably will continue to do so till some means have been found to put an absolute stop to municipal borrowing when it has reached a certain limit. In the opinion of the average municipal councillor, an expenditure ceases to be of any consequence if it can be put down to capital account. The consequence is that in many municipal undertakings every possible penny of outlay is charged to capital account and the money is borrowed, until we have arrived at the remarkable position that the local indebtedness of the country is actually increasing faster than the National Debt. The latest returns on the subject—as noticed in our editorial columns last week—are as interesting as they are instructive. In the nine years 1893-4 to 1902-3 the total indebtedness of the local authorities in the United Kingdom rose from £265,135,862 to £442,471,246—an increase of £177,335,384. The increase in the National Debt in the same period was from £667,290,715 to £798,349,190, or an addition of £131,058,475. In these nine years, the local debt of the country therefore increased half as fast again as the National Debt, in spite of the enormous cost of the South African war, much of which is included in this period.

Advocates of municipalization, it is true, contend that a good deal of this outlay is upon reproductive undertakings; and to the extent to which these undertakings legitimately earn the capital charges, with due provision for depreciation, the loans may be regarded as corresponding to the capital of public companies. But there is a good deal of municipal borrowing which is not for reproductive undertakings, and a considerable amount of debt which ought never to be incurred at all. The Progressive people in municipal affairs never stop to consider that, for every sovereign borrowed, the ratepayer has to pay back 30s. to £2. If they did they might possibly arrive at the conclusion that some of the luxuries in which municipalities indulge might be deferred until they could be absolutely paid for. As things are many corporations are so burdened with debt that 50 per cent. or more of the amount collected as rates goes to pay interest and sinking fund, and the rates rise because the borrowing increases, and the capital charges are always growing.

The remedy for these evils is easier to suggest than to apply. It clearly consists in the first place in limiting the borrowing powers of corporations, either by voluntary or compulsory means. There is little hope that any corporation will deny itself the luxury of incurring additional debt if it can thereby appear to pass on to posterity some of its obligations. In face of this temptation, the fact that it is receiving with one hand twenty shillings and is paying with the other thirty shillings for obligations incurred in former years, is likely to have little weight. Pending any possible future action by Parliament in restraint of municipal borrowing, the Local Government Board might do much to check recklessness in this direction. Its action in the Torquay case, where the rejection of an electricity scheme involving a cost of £40,000 led to such revision that the proposed expenditure has been whittled down to somewhere between £6000 and £8000, is a useful precedent, which only needs to be sufficiently acted upon to produce most salutary results. But, after all, something more than a restriction of borrowing is needed if rates are to be reduced. Good would result, no doubt, if those who feel the pinch of the high rates could themselves be induced to take keener interest in municipal affairs.

It has been suggested that shareholders in public companies should combine for the purpose of electing to the local bodies men who would remedy the evils from which they individually as well as collectively suffer. This is excellent as far as it goes, though it has to be borne in mind that the shareholders in any large undertaking are scattered over a wide area, with practically no opportunity of acting in common except in regard to the affairs of the one particular company. They can, however, all of them contribute some little to the dissemination of the truth that nothing can be had for nothing, and that all the "free" blessings which municipalities bestow have to be paid for either by those who receive them or by someone else. Another lesson which they can help to inculcate is that the business methods which are carried out in private affairs must be practised by public authorities if there are to be efficiency and economy. It is as certain as anything can be that no reduction of rates can be looked for until there is a complete change in the system on which municipal affairs are conducted. No corporation with which we are acquainted ever thinks of framing its estimates with a view to what it has to spend. What invariably happens is for each of the different committees to say that it requires so much, and the finance committee or the council adds the different amounts together and levies rates to meet the full bill.

If instead of following this haphazard system corporations were but to proceed on ordinary commercial lines, a reduction of rates would be not only possible but easy of achievement. A corporation acting upon these principles would say to itself that in its present expenditure it had reached the limit of what it could afford, and that in the coming year it could not spend a shilling more than in the past. It would then frame its estimates to come within this maximum. No hardship would be done to anybody. There would be no violent displacement of labour, and practically no change except such as might be necessary to put a stop to the expansion in all directions which has caused the enormous growth of the rates. The ratepayers would quickly reap the advantage of such a policy. They would not only have the benefit arising from the knowledge that the rates were not to be increased, but as new assessments brought in additional

income, they would enjoy the luxury—one almost unknown in these days—of an actual reduction in the rates. Simple though this plan is, and obligatory as it would be to any business man in the conduct of his own affairs, we are not hopeful that it will be adopted. In order to carry it out successfully there would have to be a judicious restriction of municipal borrowing, and neither councillors nor the majority of the ratepayers are yet convinced that borrowing is objectionable and extravagant.

ELECTRIC LIGHTING MEMORANDA.

The LonJon Power Companies and the Public—Private Consumers' Prices, Imaginary and Real—Sample Agreements with Barking and Tottenham—A Disappointing Parliamentary Session—Further Loan Refusals.

Among the remembrances of the great struggle in the parliamentary session of 1905 over the London Electricity Power Bills—and more particularly that of the Administrative Company—will always remain the unique mass of clap-trap that appeared in the London daily papers, both in the shape of advertisements and articles and advertisement-articles. We use all three expressions, because of the difficulty in several cases of allocating the published matter to its rightful class. Some of the articles were both amazing and amusing. The guileless editors and the public were, by cleverly exercised wit, won to believe that in future electricity would be for them almost as cheap as water. The price of ¾d. per unit was writ large everywhere. It was talked of, published, and bandied about as though no other price could exist if only Parliament would allow these electrical-company-promoting Trojans to work their own sweet will in their own fashion. Many of the daily papers and, as public knowledge is gained from them, no doubt the bulk of the people of London, still believe that, from the Metropolitan Electric Power Supply Company and (when the good time comes for Parliament to finally approve their scheme) the Administrative Company as well, electricity will be almost generally obtainable for ¾d. per unit. As a matter of fact, in the Bill of the latter Company, the ¾d. was only mentioned as being the initial price for regulating increases of dividend; percentages of charge below "the average price" of ¾d. entitling to more dividend. But the disillusionment of the public ought not to be long coming; and they should be shown by the agreements that have already been entered into that the low prices which have been heralded with such consistency are not for them, but merely for extraordinarily large power users and supply in bulk.

In the course of the newspaper part of the campaign, the promoters of the Administrative Company did not fail to modestly exhibit how altruistic were their aims. While looking mainly to the interests of the power consumers, they intended by their Bill to ensure that the local authorities who purchased in bulk from them should give the ordinary consumers for lighting the benefit of the low price at which they would be purchasing current. This was seen from an article published in a weekly paper (incidentally it may be stated to the credit of the Editor that at the foot the abbreviation "Advt." appeared). It was therein written that, without a certain clause, "there would be nothing to prevent any company or local authority obtaining a supply in bulk from the Company at ¾d. *or so* (which the Company is bound to give), and retailing this to the consumer at 2½d. or 3½d. per unit. In other words, this clause is necessary to ensure that the consumer shall share the benefit of the lower cost of production resulting from generation on a large scale." Of course, this was in a paper which was not likely to meet the eye of the general public. But after such pompous writing and display of a kindly interest in the private consumer, the reverse side of the picture was presented (but not before the Bill had very nearly passed through the Committee stage) in some of the agreements that were made. The fable of Pandora's box applies. The Barking agreement serves as the example of what happened after all the tall-talk about not allowing the local authorities to retail to the ordinary consumers at 2½d. or 3½d. per unit. The agreement was one for transfer; and so the Administrative Company proposed to deal with the consumers direct. The result is seen in the prices named in the agreement: For power and traction, 1d. per unit; public lighting, 1½d.; private lighting, 4d., to be reduced 5 per cent. in three years, and a further 5 per cent. the following two years. There is no mention here of the magnetic and much-adored ¾d.; nor is there any indication that what is sauce for the Municipal goose is sauce for the Administrative gander. The Company do not take steps to restrain themselves selling at 2½d. or 3½d. to the private consumers. But they do show how far truth and sincerity previously animated them in regard to private consumers by entering in the agreement a charge of 4d. for lighting, with (such magnanimity ought not to go without the fullest acknowledgment) 5 per cent. reduction in three years! Of course, the Company are not able to perform miracles any more than the existing undertakers.

To establish what we have been showing, as to how much the public can expect from these Power Companies, the illustration may go a step further; and in this case we have a Company already enveloped with colossal statutory authority. At the meeting of the Tottenham and Edmonton Gas Company a week or so since (see p. 511), Mr. Corbet Woodall drew attention to the agreement made for the transfer of the Tottenham District Council's electricity powers to the Metropolitan Electric Power Supply Company, and to the condition that attached to the agreement whereby the Council have imprudently committed themselves for ten years, from Oct. 1, 1906, to a minimum use of 110 electric lamps of an average consumption of 600 watts each. The Council are to be paid £357 expended in obtaining the Order, the expenses incurred by them in opposing the Power Company's Bill, and whatever they may have to pay (by consent of the Company or under an order of a Court of Law) their late Consulting Engineer. This seems as though there is trouble in the air with this gentleman; and the remark may be allowed that, if it were not for their considerable fees, the life of electrical consulting engineers would not possess great attraction when the much-advised authorities find that the Local Government Board doubt estimates and will not grant loans, or undertakings cannot be urged to produce net profit approximating prophecy. But our subject is as to how far the loudly trumpeted anxiety of these London Power Companies to serve the public in the matter of unprecedented cheapness for electricity is being justified under signed agreements. The Tottenham contract provides for the energy required for the street-lamps being paid for at the rate of 2d. per unit between dusk and midnight, at 1d. per unit between midnight and dawn, or 1½d. per unit for lamps alight between dusk and dawn. But the Council have to provide the lamps, and do all the trimming, cleaning, and maintenance, or else contract with the Company for the latter service. There is nothing exceptional about the terms; for there are many municipalities in the country—rightly or wrongly—supplying themselves on similar and lower terms, and these find the lighting expensive compared with incandescent gas lighting. There are four, if not more, Borough Councils in London supplying themselves for street lighting at between 1½d. and 2d. per unit. Then again where is there anything to show that this Power Company's supply is to be preferred to any other in the charges that they propose for private lighting. The terms arranged are, on the maximum demand system, at the rate of 6d. per unit for the first 100 hours' use of the maximum supply demanded in the quarter, and 2d. per unit for all subsequent consumption, or in the alternative, at the option of the consumer, at a flat rate of 5d. per unit. The 6d. and 2d., on the maximum demand system, are common charges; and the flat price of 5d. per unit is high as things go now with large undertakings. The Power Company are therefore doing absolutely nothing out of the ordinary for the private consumer.

It will now be the business of the Tottenham Gas Company to show, in meeting the competition, that consumers, with five pennyworth of electricity, will be able in an hour to use thirty 8-candle power incandescent electric lamps; while sufficient gas can be obtained, at the present price, for 5d. to supply between forty and fifty 50-candle power incandescent gas-lamps. The consumers will have to judge between the number of lamps and the 8-candle and 50-candle power. Again, for power purposes, if the power demanded does not exceed 5-horse power on the maximum demand system, the price is to be at the rate of 4d. per unit for the first 100 hours' use of the maximum supply demanded in the quarter, and 1d. per unit for all subsequent consumption. If the power demanded exceeds 5-horse power, then on the maximum demand system, the price is to be at the rate of 3d. per unit for the first 100 hours' use of the maximum supply demanded in the quarter, and 1d. per unit for all subsequent consumption. Again, we ask, Do these prices suggest any advantage over what private and municipal undertakings are doing? The Tottenham District Council have not, in our opinion—looking at the matter independently of the competition with gas—fully and fairly defended the interests of their district. However, if it were not for that unwise ten years' public lighting contract, we should say that the whole of the terms of the agreement are highly satisfactory for the Gas Company; and it may with safety be said that they will prove the truth of this statement. The agreement also provides for the Council, after ten years, participating in the surplus profits to the extent of one-half after 5 per cent. has been paid upon the amount expended in the area of the Order. Before the Council will have the felicity of sharing in the profits, the Company will have the right to make up past deficiencies; so that for the Council's prospects no one will be prepared to make a very high bid. The figures embodied in the agreements referred to do not support the proclamation industriously made by the promoters, that the Power Companies are going to be the great benefactors of the whole of the people of London.

The electrical press are not by any means elated over the results of the past parliamentary session in respect of electricity. The difference between electricity and gas was that the session, in the former, started with a heavy batch of promotions, and ended with a heavy batch of non-successes; while in the case of gas, the promotions were, looking back, comparatively light, and the record of the success was complete. Another difference was that while electricity absorbed an enormous amount of time, and had an enormous amount of money spent over it, gas on the other hand occupied little of the time of Committees and the total expense could not have been great, except over the London Bills. It will be remembered that eight Electricity Bills for London were introduced; but most of them suffered annihilation in whole or in part. The Metropolitan Electric Supply Company's Bill was the most brilliant success; and the Administrative Company's Bill the

most deplorable (for the promoters) sacrifice to time-pressure in the session. The Electric Lighting Provisional Orders were not great in number; but they went through without notable injury. We are compelled to set the "Electrician" right in respect of a statement made in connection with them. In reviewing the work of the session, our contemporary says: "Applications for the insertion of the Bermondsey clause have not been numerous; and the few gas companies that asked for the clause met with little success." It is preferable to refer to the clause now as the Northumberland, and not the Bermondsey; and, while admitting that there were gas companies who were not successful in applying for its insertion, our contemporary will find that support to their assertion is not to be found in the Orders included in the Confirmation Acts Nos. 1, 3, 5, and 7, and perhaps others. [See "JOURNAL," May 16, p. 422.] Provincial power measures did not bulk largely in the session; but electrical railway and tramway Bills were a feature. There were few remarkable points of interest so far as electricity supply for private purposes goes; but the expulsion of the electric wiring clauses from the London County Council Bill is not regarded with dissatisfaction.

Lest it should be thought that the Local Government Board are slackening off in the good work of preventing injudicious electric light schemes being carried out by local authorities, it is placed on record that they have declined an application by the Saffron Walden Council for sanction to borrow £9950 for electric lighting, and suggest the transference of the Order to a company. Similarly they have refused to grant power to the Wisbech Council to raise £25,000 for a scheme. May such wisdom continue to govern the Board's actions.

THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 581.)

THE tendency on the Stock Exchange last week was variable. The markets have for some time been clinging (pertinaciously clinging) to the belief—more or less sincerely entertained—that peace would be the outcome of the Roosevelt negotiations. But last week there were signs that the prolonged tension was becoming too severe to resist much longer the disheartening nature of actual circumstances. And so prices gave way one day, and then steadied again the next—movements alternating almost daily, especially when bears became timid and wanted to cover themselves. The Money Market showed pronounced ease; the supply being abundantly in excess in requirements. Discount rates kept fairly steady. Business in the Gas Market was decidedly quiet, so far as the volume of recorded transactions went to show; but there was a strong demand for choice issues, and there was a general upward movement affecting a very large number of undertakings. Debenture stocks were conspicuous among the improved quotations. In Gaslight and Coke issues, there were only one or two transactions daily, and prices rose gradually as time went on. A small parcel was done free at 99¼; but most of the bargains were at par or 100¼. Of the secured issues, the maximum was done at 91 and 92, and the debenture at 88½ and 89—each issue gaining a point. The preference marked 109½ special, and 110¼. In South Metropolitan, there was only one deal; the price named being 130¾, and the quotation being one point up. The debenture changed hands at from 88½ to 90. In Commercials, there was one deal in the 4 per cent. at 120, and one in the debenture at 88¼. All three issues advanced a point. Among the Suburban and Provincial group, British marked 42 and 42¼; and that was all the business done. But a large number of quotations advanced (as reference to the list will show), though Brighton and Hove, which announces an increase in the rate of the next dividend, was not among the number. Business in the Continental companies also was very slack. Imperial changed hands at from 212 to 213½; Union marked 111½ and 112, with a small amount free at 111; and European fully-paid 22½, with a rise of half-a-point in the quotation. Among the undertakings of the remoter world, Bombay marked 6⅞, and ditto new 5¼. Cape Town was done at 17⅜. Buenos Ayres changed hands at 12⅜, River Plate at from 12⅜ to 12 15/16, Primitiva ordinary at from 6¼ to 6 5/16, ditto preference at 5 5/16, and ditto debenture at 98. San Paulo was done at 13; and Monte Video was active at from 11½ to 11¾.

The closing prices are shown in our Stock and Share List on page 581.

At the meeting of the Gas Committee of the Manchester Corporation on Friday, Alderman Gibson, the Chairman, was in his place for the first time since his serious illness, and received the congratulations of his colleagues on his restoration to health.

The discovery is reported of a remarkable supply of natural gas at Yamachiche, Quebec. The work of one company boring for oil has been stopped by a flow of gas, salt water, sand, and rock that is beyond control. The flow started when the drill had reached 280 feet; and it was so strong that it forced drill, derricks, and trappings out of the well, and threw a stream 200 feet into the air. The flow followed after an explosion which shook the earth for a great distance. As a consequence of this unrestrained rush of gas, the work on the well is suspended. In the same district, at Ste. Geneviève, natural gas is already in use as fuel.

MANCHESTER DISTRICT INSTITUTION.

The Excursion Meeting.

THE experiment of making the Summer outing of the Institution an "open" meeting—that is, not restricted to members and one to which their wives and lady friends were invited—has turned out such a success for this year that no doubt similar arrangements to those under which Saturday's trip into Derbyshire was carried out will hold good for a series of years, and will grow in popularity as time goes on. Some fifty excursionists (about twenty of whom were ladies) went by train to Bakewell; and after lunch at the Rutland Arms Hotel there, drove to Matlock Bath. A stop was, naturally, made to allow a visit to Haddon Hall; and in the historical old garden a photographic record of the party was secured. Then the drive was continued to Winster Bank (where, at the "Holly Bush," tea was served for the ladies of the party), and then by the Via Gellia to the New Bath Hotel at Matlock Bath. After "high tea" here, there was still time for a stroll about the hotel gardens and through the streets of the famous health resort before the outgoing trains claimed the attention of the trippers. The weather throughout the day—though at times threatening—proved kindly disposed for outdoor enjoyment; and the admirable arrangements made for the comfort and convenience of the party by the President, Mr. S. Meunier, and the Hon. Secretary, Mr. H. Kendrick, were carried out without a hitch and—to time.

TAR MACADAM FOR ROAD MAKING.

THE motorist has taken possession of our highways; and obtaining gratification for himself by flying through the country at such a rate that he cannot possibly enjoy the pleasures for which other people usually go to the country, he envelops all users of the road in clouds of dust, and obscures the freshness of trees, hedges, and grass adjacent to the public highway. There has been some discussion as to whether the growing craze (or whatever other descriptive word, and there are many which may be applied to it) for motoring is not having some evil effect upon the surfaces of our roads. Seeing the quantity of dust that in dry weather is scattered a distance from the surface of the road by each succeeding motor, there cannot be a great deal of question about the injury, though the dust lying upon the surface itself may be the creation of heavier vehicles. Upon this point another has been hung, and that is as to whether, under the changed conditions of use to which roads are put, the best form of construction is adopted—that is to say, the form of construction that will maintain the condition of greatest comfort for all users, that has the greatest endurance, and that over a course of years will show the greatest economy. Now these are three aspects of the question of road construction forming a combination which, we understand Mr. J. George-Powell, the Engineer and Surveyor to the Godstone District Council, to say can be realized by the use of tar macadam. We gave a short paragraph a few weeks since referring to Mr. George-Powell's views, and the results of his inquiry into this question. Since then that gentleman has kindly forwarded to us a copy of the report he made on the subject. It is a substantial document, covering in print, with the tables, some 21 foolscap pages. But into it we will dip, as any suggestion that gas managers can make use of in developing outlets for their tar, is at the present time particularly welcome. It was only the other day that Mr. D. Irving, in his Presidential Address to the Institution of Gas Engineers, was telling us in reference to one of his diagrams that a "salient feature is the absence of any sign in the tar-line of the great development of the fine chemical industries, which is generally asserted to be a mine of wealth to the gas-maker. As a matter of fact, the value of tar to the gas-maker has declined during the past twenty years." This being so, then cordial welcome to other developments in its use.

There is no doubt that, while traffic was light, the ordinary methods of road making and repairing answered fairly well. But the changed circumstances of traffic—with its two extremes of heavy and light mechanical vehicles—has found out the weaknesses of the roads. The manner in which repairs were formerly done was, we learn from the report before us, by the metalling of the surface of the highways with stone broken to usually 2-inch gauge, and generally laid on the natural soil irrespective of the foundation—the result being that these small cubes were pressed into the subsoil by traffic which caused the subsoil to gradually ooze through the interstices to the surface. Had a foundation been made with material from 6 to 9 inches in diameter prior to the application of the 2-inch material, the roads at the present day would be stronger and freer from dirt than they are. The heavy traffic brings the subsoil to the top; and the motor cars do their best to scatter it to the four winds to the discomfort of all other users of the road. However, both these extremes of locomotion have come to stay; and the question is how should roads be made to meet these requirements of practically recent date. To make a dust-proof and a dirt-proof road is an easy matter; but where the difficulty comes in is to make such a road at a cost that will not increase the present highway rates.

In Godstone and the neighbourhood, as in many other districts,

roads have been treated with various kinds of materials for the purpose of laying the dust; but surface treatment has not up to the present proved a permanent success. As a result of his study of the matter, Mr. George-Powell contends that what is required, to make a dust and dirt proof road, is a different kind of binding material. The metal used on the roads is good; in fact, none better. The manner in which it is laid and consolidated is also all right. But to make a dirt-proof and dust-proof road, the crown or crust must be made water-tight; and in making the surface water-tight, due consideration must be given to the kind of material which is to be used for the purpose. Bearing in mind that the surface of the road is subjected to extremes in weather and also traffic, Mr. George-Powell has come to the conclusion that coal tar has the properties necessary for making a water-tight road when mixed with the metal. He mentions that there are three gas-works comprised in the area of the Godstone District Council; and two only a short distance outside. Therefore, tar can be conveniently obtained at little cost—viz., 1½d. per gallon at the works. With the tar, it is necessary to mix a small proportion of common pitch and creosote. These materials must be placed in a caldron, or other convenient vessel, and heated to 212° Fahr. The metal must also be heated to such an extent as to evaporate all moisture; and it is then mixed with the tar, while both are hot. Up to a recent date, this work was done by hand—the metal dried on hot-iron plates, and when thoroughly dried mixed with the tar by hand labour.

The heating of the tar and the materials, as well as the mixing, is now done by the same machine; this being an invention of Messrs. Brown and Clarke, of Nottingham. Mr. George-Powell, in his report, describes the machine and its working; and it is of such interest that we extract the information. The apparatus consists of a hopper into which the material to be treated is delivered from cart or truck, by tipping or other suitable method. The material is fed into a cylinder from this hopper by ingenious mechanism, which regulates at an even rate the supply of the material. The cylinder is divided into longitudinal compartments, and inclined so as to readily pass the material through it. It is mounted on anti-friction rollers, to minimize the power required to drive it. Inside the cylinder is an inner cylinder or trough containing a worm conveyor. Under the apparatus are two combustion chambers in which coke fires are maintained to supply heat to the outer cylinders, to the longitudinal compartment in this cylinder, and also to the outside of the inner cylinder or trough containing the conveyor. These combustion chambers also supply heat to two tanks holding the tar or other mixture; these tanks being placed at the lower end of the apparatus, in the form of a saddle over the cylinder. Connected with these tanks are pipes, which are coupled to a perfectly simple, but ingenious, piece of mechanism, for automatically distributing or spraying the tar on to the material.

The process, therefore, is as follows: The material is delivered into the hopper, and is fed automatically into the longitudinal pockets in the cylinder. As the cylinder is inclined, the material is slowly passed through it during its revolution, and thoroughly dried and heated. It then falls into the lower end of the inner cylinder or trough, where it receives its proper amount of tar, and is turned over and mixed in the trough, which contains the worm conveyor. It is then delivered at the upper end thoroughly mixed and coated. The quantity of tar is adjusted to the speed of the feed of the machine; and there can be no surplus or deficiency of tar. This is an important point. The weight of the machine is about 12 tons, mounted on wheels. Therefore there is no difficulty in moving it from one part of the district to the other. As to the power required to drive the machine, Mr. George-Powell says that one of the road rollers, on 25 lbs. steam pressure, would supply the necessary 4-horse power. The price of the machine complete is £350. Considering the advantages gained over mixing the material by hand labour, he regards the price as very reasonable. With two men, including the driver, the machine is capable of mixing in an ordinary working day 35 tons of material; whereas he has had six men engaged to mix only 20 tons in a day, and this was considered a good day's work. In addition to the tar macadam mixture, it is necessary to have a tar-boiler, to provide hot tar, which should be mixed with the scarified surface of the road before the prepared macadam is applied. The cost of this boiler would be £50.

Proceeding to show the cost of making the tar macadam, and also of tarring the scarified surface before the macadam is applied, Mr. George-Powell is liberal, and puts the interest on the £400 capital referred to above at 5 per cent. This would amount to £20 per annum; repairs of machinery at 5 per cent. per annum, £20; annual depreciation in value at 10 per cent., £40—making a total of £80 per annum. The use of one of the steam-rollers would be required to drive the macadam-mixer; and so, in the report, it is assumed that the power necessary has to be purchased. The roller is therefore valued at £250; and in connection with this, interest, repairs, and depreciation work out at £50 per annum. The machinery and power necessary for making the tar macadam, therefore, amount to £130 per annum. The tar-mixer and the tar-boiler would consume 2 cwt. of fuel daily, at 1s. 3d. per cwt., which is equal to 2s. 6d. The engine driving the macadam-mixer would consume 3 cwt. of fuel per day, which would be equal to 3s. 9d. Two men would be engaged with the engine and mixer at 4s. per day, which would mean 8s. The amount of tar used daily by the macadam-mixer would be 280 gallons (sufficient to mix 35 tons of material) at 1½d. per gallon; and this would amount to £1 15s. Of common pitch, 560 lbs. daily would be required, at 50s. per ton, which would amount to 12s. 6d. A similar quantity of tar and pitch would be used on the scarified road at an equal cost of £2 7s. 6d. per day. Cartage of tar, pitch, and tar macadam is placed at a sum of 25s. a day. Therefore it is seen that, on Mr. George-Powell's computation, the total cost of machinery, power, accessories, labour (team and manual), and materials for making 35 tons of tar macadam (exclusive of metal), and delivering on to the road, including the tarring of the scarified foundation, is £7 7s. 3d., which would be an increase on the present cost of metal to the amount of 4s. 2½d. per ton.

However, it is maintained that the advantages will compensate for the increase. With tar macadam, there will be no necessity for carrying out repairs triennially, as a road made of this material will be found to be in good order after seven (even eight) years' traffic. This, says Mr. George-Powell, is not a statement based on theory, but on actual knowledge of fact. The system or method of treatment is by no means new to him. In 1894 and 1895, when he was Engineer and Surveyor to the Rural District Council of Pocklington in East Yorkshire, a track of tarred macadam was made and used under his direction. In September last, he had occasion to visit one of the places in the district named, where tar macadam was laid under his direction in July and August, 1894. Although more than ten years had lapsed since it was put down, it was in good repair when he saw it. During his holidays last year, he drove over more than 1200 miles of road leading through Middlesex, Hertford, Buckingham, Bedford, Northampton, Huntingdon, Nottingham, Lincoln, and Yorks. In four or five of the counties he inspected tar-macadam roads, some recently laid and some of long standing. Both were in a perfect state of repair, and entirely free from dust or mud. He inquired of the men engaged on these roads, and gathered from the replies obtained that the cost of manual labour had considerably decreased by its use.

To make the matter perfectly clear to his Council, Mr. George-Powell put before the members the following statement by which they could judge their own position by adopting the excellent advice of their Engineer:—

To amount which would be realized on account of certain work which would be dispensed with, assuming new proposed method is put into practice	£331	9	6	To amount of additional cost which it would be necessary to expend on preparing, or rather making, the present metal used, tar macadam—viz., 6000 tons, at 4s. 2½d. per ton.	£1262	10	0
To amount which would be saved in consolidation	88	0	0				
Total credit obtained from annual work sufficient to keep a road in repair on an average for *Three Years*	£419	9	6	Total cost of making tar macadam sufficient to make a road which would be dirt and dust proof on an average for *Seven Years*	£1262	10	0
Amount of credit per annum	£139	16	6	Amount of cost per annum	£180	7	1
Total additional cost of making tarred macadam roads compared with present system per annum	40	10	7				
	£180	7	1		£180	7	1

Briefly what Mr. George-Powell contends is that at present the average life of a road, or rather the repairs, is three years, during which time the condition is either dirty or dusty. By spending nearly double the amount of money at present expended, the roads can be made to last seven or eight years dustless and dirtless. The outlay for the improved method of road making would, over the longer period, work out to less than would be incurred under the ordinary system within that period. Therefore, not only does tar macadam mean comfort to pedestrians and those employing vehicular methods of locomotion, but it also means economy. Gas engineers will perhaps render their residuals accounts some advantage by bringing before the Engineers and Surveyors of their local governing bodies what Mr. George-Powell has to say on this important current topic.

The Société Française des Habitations à Bon Marché are organizing an international competition between cheap and reliable water-meters suitable for use in industrial dwellings. The meters should be capable of standing without leakage a head of 492 feet, should indicate with a flow of 5¼ pints per hour, and be capable of passing 51¾ gallons per hour with a loss of head of not more than 6 ft. 6 in. Maximum error must not exceed 5 per cent. in the case of a flow of more than 13 gallons per hour, but for smaller flows it may be 30 per cent. The error must, however, always be in favour of the consumer. No meter which fails to meet this condition will be allowed to enter for the second series of tests, in which 1,102,000 gallons will be passed through at different rates of flow, and at the end of the trial the meter will be again tested for accuracy and absence of leakage. Further information can be obtained on application to the Society, No. 4, Rue Lavoisier, Paris.

OBITUARY.

GEORGE BRAY.

It is with sincere regret, in which, we are sure, a large number of our readers will share, that we announce the death, on Tuesday morning last, at his residence, Belmont, Headingley, of Mr. George Bray, the founder and Managing-Director of Messrs. George Bray and Co., Limited, of Leeds. Deceased had not been in good health, having had apoplectic seizures. Early in the present year, however, he spent two months in Greece, with beneficial results. Indeed, he was so much better that he was able to undertake his daily work with his accustomed energy. He was a keen sportsman, and only the week before his death was out shooting on Denton Moor. On the Friday he was at business, apparently in good health. The next day he was being driven in a closed brougham to the Bagby Works, when he became conscious of an approaching seizure. He at once requested to be taken home; but by the time the carriage reached Belmont the occupant was helpless. Medical assistance was promptly summoned; but recovery was regarded as hopeless.

Mr. Bray was born in Leeds in 1841, and was therefore in his 64th year. In his youth, he became attached to the woollen industry, in which his father was engaged. The work, however, was distasteful to him, being of a mechanical turn of mind, and his evenings were devoted to self-improvement at the Mechanics' Institute. While attending the classes there, in 1863, he conceived the idea of improving the old iron gas-burner, so as to enable it to give a better and more steady light. Two years later, when he was 24 years of age, he took out his first burner patent. His early efforts were not altogether successful; but he persevered in his experiments, and eventually produced the burner with a non-corrosive tip which has been so largely adopted. The making of gas-burners became such an important part of his work, that he resolved to devote himself entirely to it; and about the year 1872 he took a small factory in Blackman Lane, and soon found himself in the full tide of business. An efficient flat-flame burner which could be bought at a price that would bring it within the reach of all classes of consumers was much wanted; and Mr. Bray's ingenuity and perseverance furnished it. The production of the porcelain-tip burner was for a long time the main feature of the business; but in 1878 or 1879, Mr. Bray turned his attention to the improvement of the lamp in which the burner was to work. The result was the production of a lantern in which, in place of the old square glass case, one was used which tapered downwards, so as to avoid throwing a shadow upon the ground in the immediate vicinity of the post, and increasing the illuminating power of the gas-jet by placing reflectors in the roof. An important feature of the new lantern was that it was wind-proof. These lamps have become as familiar as the name of the inventor. Ample evidence of Mr. Bray's inventiveness is afforded by our "Register of Patents" during the past thirty years. Between 1872 and 1903 he took out numerous patents for improvements he had effected in gas-burners, street-lamps, stoves, governors, and in lighting, warming, and ventilating rooms.

The growth of the business necessitated larger premises in which to carry it on; and about twelve years ago Mr. Bray removed to the present works in Bagby Fields, which are equipped with almost every mechanical device in the realm of gas lighting. In 1903, the concern was converted into a private limited liability Company, who have gone with the times, and have included in their business the supply of incandescent burners and mantles. They have also produced a burner for acetylene gas, which enables the user to turn down the light without fear of the top becoming plugged with soot; and they have likewise brought out an anti-pulsator for gas-engines. The stand of the Company at the Earl's Court Exhibition, and more recently at the Ironmongery and Hardware Exhibition at the Agricultural Hall, furnished ample proof of the continued existence of the enterprise which had founded the business and brought it into such prominence in connection with the gas industry.

The man who could initiate and build up such an establishment as that at Bagby Fields necessarily possessed a marked individuality. He was quick to detect and resent any encroachment upon his domain; and he defended with vigour his rights as an inventor and as the owner of a large business. Consequently, he was not unfrequently engaged in litigation, as the columns of the "JOURNAL" testify. It was because he considered he had been unfairly treated in connection with the Electric and Gas Exhibition at the Crystal Palace in 1882-3, that he assumed towards the Gas Institute the hostile attitude which resulted in the division of the members into two separate bodies in 1888. Happily the unpleasant incidents of those years have been effaced by subsequent events, which not only brought about a reunion of the two organizations, but a reconciliation of the two chief actors in what might almost be called a drama. On the formation of the present Institution of Gas Engineers two years ago, the question arose as to the election of honorary members; and Sir George Livesey expressed the pleasure he felt at Mr. Bray's name being associated with his own in this respect. He added that if it had not been so associated, he would have been deprived of the greater part of the pleasure he felt. "In electing Mr. Bray as an honorary member, the Institution had," he said, "only done what was right and proper." With such testimony as this to Mr. Bray's worth, this matter—the one dark cloud over a life of useful work for the gas industry—may well be left.

Though actively engaged in business, Mr. Bray, like many fully occupied men, found time to interest himself in other matters. He was a practical friend to education, as shown by his frequent gifts of scholarships to the higher-grade schools of the city. He was a life governor of the Yorkshire College, having contributed £500 to the funds; and as a member of the Court of the new Leeds University, he had promised £1000 to the foundation fund of that institution. He was a Liberal in politics, and a member of the Wesleyan Methodist body; but though keenly interested in Imperial and local politics, he took little active part in either. He was fond of athletics, and a thorough believer in fresh air; the latter quality being conspicuously displayed in his care for his employees. The lighting and ventilation of his factory were all that workpeople could desire.

Mr. Bray was a widower, having lost his wife some fourteen years ago; but he is survived by three sons and two daughters. Two of the sons (Mr. J. W. Bray and Mr. Arthur Bray) take an active share in the business; the third son being still at school. The body was cremated at Lawnswood Cemetery on Thursday afternoon; the funeral being attended by the Secretary of the Company (Mr. H. Mudd), the heads of departments, and nearly all the workpeople in the employ of the deceased. There was a large gathering of Mr. Bray's friends and fellow-citizens who desired to pay a last tribute of respect to his memory; among the former being Mr. Joseph Hepworth, of Edinburgh, and Mr. Matthew Leaf, of York, the President of the North of England Gas Managers' Association, of which Mr. Bray was an associate member. He was also an honorary member of the North British Association of Gas Managers.

It is with regret that we receive notice of the death, on the 10th inst., of Signor GIOVANNI TOSATTI, the Engineer and Sub-Manager of the Genoa Gas-Works of the Union des Gas Company. The deceased had been associated practically all his life with the gas undertaking of Genoa, and as lately as June last took an active part in the annual meeting of the Italian Gas Society, as reported in our issue of July 18. Signor Tosatti, who was only 62 years of age, was a very able and well-known gas engineer; and his genial and kindly courtesy will be remembered by all who knew him. The funeral took place at Sestri, near Genoa, on the 11th inst.

Mr. JAMES M'EWAN, the Manager of the Corporation Gas-Works, Gourock, died there on Monday last week, in his 80th year. He had held the position of Manager at Gourock for upwards of forty years. In his youth he was in the service of Messrs. W. & B. Cowan, and latterly was one of the few survivors of the employees who worked for the firm when they were located in Glasgow. For some time he had been in poor health. He was a most capable man for the post he held. The great problem of his life was how to make his works keep pace with the needs of a rapidly growing town; that he succeeded in doing so is borne out by his working record. He is survived by a widow, three sons, and a daughter.

Lights and Lighthouses.

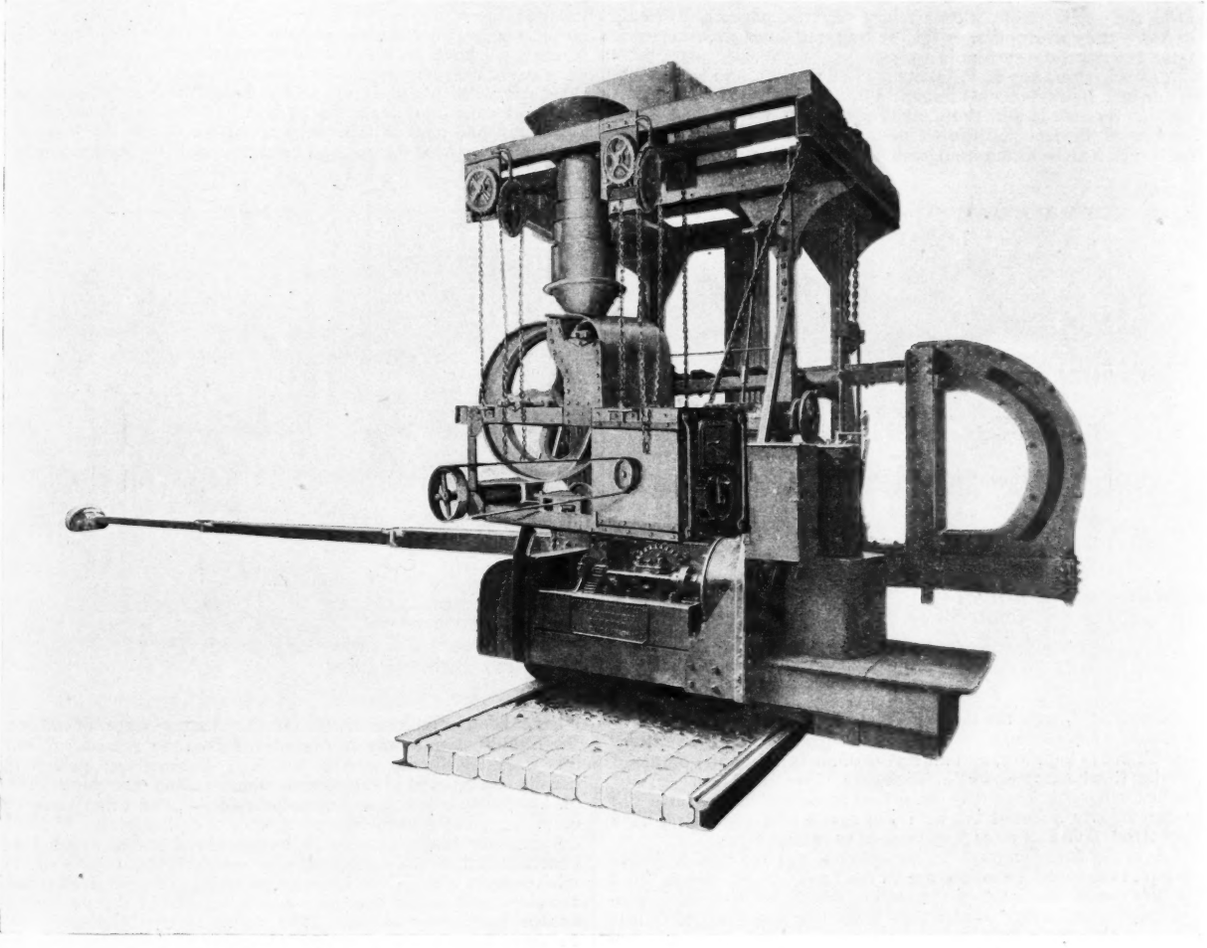
The subject of lighthouses has always a popular interest; and there is no doubt an article appearing in the current "Windsor Magazine," by Mr. George Lorimer, has been, and will be, very widely read. The information of which the article is composed was largely collected during a visit paid to the famous lighthouse works of Messrs. Chance Bros. and Co., Limited; and that is sufficient guarantee of its authenticity. Towards the close of the article, after dealing with the structures and the beautifully designed instruments with which they are fitted, the writer refers to the improvement that has been effected in the lights themselves. He says: "This important improvement practically originated, I believe, only in the last two or three years, and is the substitution of incandescent oil-burners for the oil-wick burners of former days. The same oil is used—light mineral oil—but it is vaporized, with the result of a gain in economy of consumption, and an increased intensity. Let me demonstrate this briefly, just as it was explained to me. The six-wick oil-burner, with a flame of 4½ inches, gave a candle power of 700; the incandescent oil-burner, with a mantle of nearly 3⅓ inches diameter, gives a candle power up to 2400. The intensity is threefold; while the oil consumption is reduced by a fourth. The six-wick burner used to consume half-a-gallon of oil per hour; but the incandescent burner needs only 2½ pints per hour. A typical incandescent burner light is that on Beachy Head. So far, the electric light has been sparingly adopted. Only four among the many lights controlled by the Trinity House are electrically illuminated; these being St. Catherine's, the Lizard, the South Foreland, and the Souter Point on the northern coast. Electricity is utilized in several of the smaller lighthouses, such as serve in estuaries and harbours, and are under the authority of individual Harbour Boards. But, generally speaking, it has been found that the electric light is very sensitive to the state of the atmosphere; and in thick foggy weather, it is said, it parts with its power in a much greater ratio than does either oil or gas light. On the French coast, there are upwards of a dozen first-class electrically illuminated lighthouses; but in the existing Lizard light, England can boast the most powerful of all marine lights in the world."

THE "D.B." PATENT COAL-PROJECTOR.

Combined Discharging and Charging Machine.

THERE are many retort-houses in this country containing from six to ten beds of through retorts, into which it has, so far, been regarded by the engineers as impracticable to put stoking machinery on account of the expenditure involved. In such retort-houses, the maximum winter demand can be met by using about 75 per cent. of the total number of retorts; while the minimum summer make will not require more than 25 per cent. of the beds for its production. In most of these small places, two stokers per shift can do all the work of the retort-house for four months of the year. It is difficult to work a retort-house with less labour than two men either by machine or by hand. Consequently no monetary saving can be effected by any form of machine during about one-third of the year though the actual saving in hard work may be very great. To justify the expenditure of capital upon stoking machinery in such a works, the first cost must be kept very low—the number of men employed during the periods of medium and maximum make must not be materially greater than during the summer period; and the balance of saving must be made up by other advantages, such as increased output per mouthpiece, and more efficient working of the retorts. In a retort-house of eight through beds, six beds will frequently do the greatest make in winter; and it is, therefore, easy to understand that a machine which is capable of discharging year in year out twenty through beds, is only very lightly loaded, and is always working under very disadvantageous conditions, regarded from the standpoint of capital expended in proportion to work performed. Yet no material difference in design or in power required is possible; for a full-sized retort in a small retort-house needs the same force to discharge the coke as the same sized retort in a large house. The wear and tear, however, of the machine in the small works would be very much less, and may almost be neglected when the same machinery is used. Moreover, it is actually an advantage as regards efficiency in such a case to increase the use made of the machinery as much as possible.

Having appreciated the force of these considerations, Messrs. W. J. Jenkins and Co., Limited, of Retford, have recently



THE "D.B." COMBINED DISCHARGING AND CHARGING MACHINE.

designed a combined retort discharging and charging machine suitable for small retort-houses, by attaching to their standard self-propelled pusher-discharging machine the simple "D.B." projector, in its original form. The principle of discharging coke from 20-feet retorts by pushing appears to have met with decided success, as we understand that there are six discharging-machines of Messrs. Jenkins and Co.'s make in operation, and ten more on order, at the present time. As there are sixteen installations of the "D.B." patent coal-projector in successful operation in England alone, and fourteen more in various stages of construction, it may be said that both parts of the combination are proved successes. The result of the design is the neat and workmanlike machine here illustrated. Such a combination would, of course, be quite out of place in a large retort-house where not more than a minute per retort can be allowed for both operations of discharging and charging; but in smaller houses, where (say) thirty retorts have to be charged every two hours, a machine of the kind shown by the photograph should be very useful. In large retort-houses, the machine men mostly work one-and-a-quarter hours and rest three-quarters of an hour; and it does not seem unreasonable to ask the machine man in smaller houses to work at least half the time. The combined machine meets this condition in a very simple way; and the first cost is much less than that of two separate machines. The fact should not be forgotten that this machine is fitted with power in all its motions, calling for no manual labour from the driver beyond the turning of the necessary controlling levers, and putting certain clutches in or out of gear.

The discharging-machine is exactly the same as that described in previous issues of the "JOURNAL." The charging portion is suspended from the extended top frame of the machine—being guided and held steady by a turned pillar on one side, fixed top and bottom to the discharging-machine frame. The combined machine will work in any retort-house where the distance from the brickwork of the bench to the retort-house wall is 14 ft. 6 in., and will deal with 20 feet through retorts. With one of these machines, it may be reckoned that 6 to 7 tons of coal per man employed in the retort-house can be handled, including all labour of charging and discharging, wheeling coke, and attending to fires. There is a consensus of opinion among those who have used the projector that a larger make of gas per retort is obtained than was the case with hand stoking.

THE WORKING OF GENERATOR SETTINGS WITH EXTERNAL PRODUCERS.

By D. W. Tooms, of Fermoy.

[A Paper read before the Irish Association on Aug. 15.]

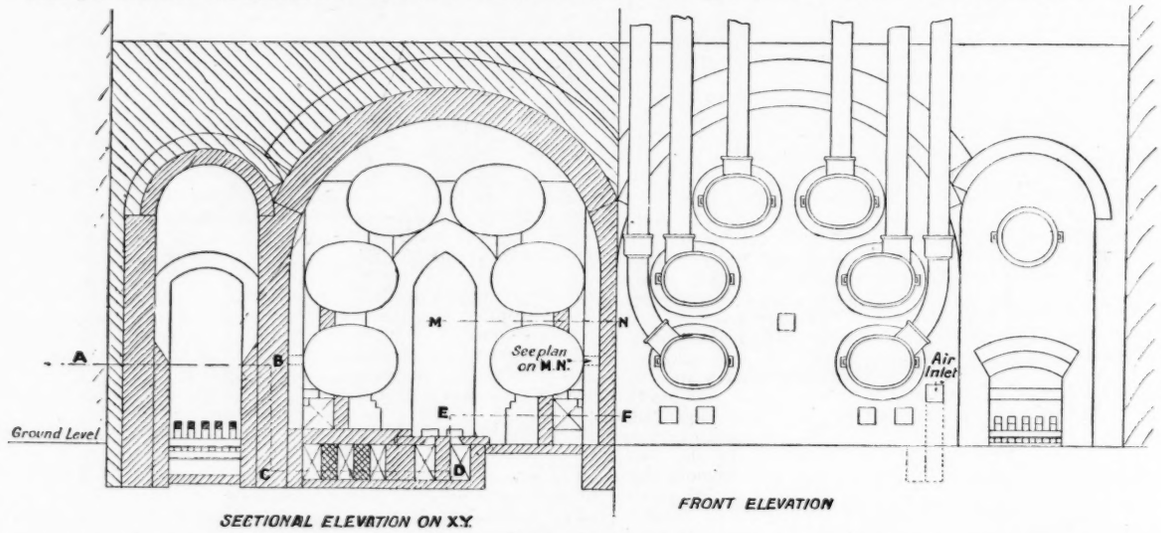
At our meeting in Waterford in 1903, Mr. Anderson read a paper describing the system in vogue in that city of firing settings with external producers. I, having for the past two years been responsible for the working of similar settings, have chosen for my subject the working of that class of setting. I have two works under my supervision—viz., the "town" and "military"—making, respectively, about 11 and 5 million feet annually. It is at the former that I have the outside producers, which are the subject of this paper.

These works are in rather a low-lying situation, and liable at times to be flooded by the river, which in the past has often caused serious inconvenience by putting the town in darkness. To avoid this, a setting of six retorts with a producer at the side was erected in 1896; and this setting, with some modifications, has been in pretty regular use since it was installed. It may bring the members into closer touch with this paper if I briefly describe the construction of this setting, although Mr. Anderson fully described the system in 1903.

The large arch is 7 ft. 10 in. high, 7 ft. 6 in. wide, and is set with six 21-inch by 15-inch oval retorts, 9 ft. 8 in. long. The producer arch at the side is 7 ft. 10 in. high by 2 ft. 6 in. wide. The front portion of the arch constitutes the furnace; a back bridge being built 3 ft. 6 in. from the front, over which is built a curtain to the crown of the arch. The bottom of this curtain is 3 ft. 6 in. from the fire-bars. A 6-inch lining is built on the furnace sides and carried above the zone of combustion. We thus have a furnace 3 ft. 6 in. by 3 ft. 6 in. by 1 ft. 6 in. The space above the bottom of the curtain is 3 ft. 9 in. high, and is used as a reservoir for coke. The feed door is an old mouthpiece built into the front wall; and the clinkering door is of Dempster's make with planed faces. The primary air is admitted through an adjustable slide in the bottom of the clinkering door, and passes straight under the furnace bars, without pre-heating. The resultant gas passes under the curtain, over the back of the bridge, down into a transverse flue under the sole of the oven, to the centre of the setting, where it comes to the front, giving gas through five large ports equally spread the whole length of the setting.

The secondary air is admitted on one side only of the setting, under the sole of the oven, and passes through the chequer work to the back, and comes to the front in a flue parallel to the gas flue, giving air through ports opposite each gas-port. We have no recuperation; the secondary air taking live heat from the setting. With a setting under-fired, it is generally found that the combustion is allowed to take place at the front portion of the setting—*i.e.*, over the furnace, when there is a risk of local heating. With my setting, owing to the gas and air ports being distributed the whole length of the setting, and also owing to the large combustion chamber we are able to have in lieu of the furnace, we have an equal heat throughout the setting; and I have never yet seen any signs of local heating.

Lighting up this class of setting undoubtedly requires some care and watchfulness on the part of the manager, to avoid explosions. One method is to keep a shallow fire in the furnace, admitting an excess of air, and thus consume the fuel direct to



SECTIONAL ELEVATION ON X.Y.

FRONT ELEVATION

carbonic acid, until the lower portion of the setting is heated to redness, when the furnace is filled and secondary air is admitted. If the fire is kept low, and an excess of air is constantly obtained during this heating-up of the brickwork, there is no danger; but it has occurred more than once that these conditions have not been strictly adhered to, with the result that explosions have occurred, doing more or less damage to the setting.

A much safer method, in my opinion, and the one I always adopt, is to make a shallow fire in the furnace, and also to build a hob round the front of the setting, where an opening is provided, making a fire here, which heats the lower tier of retorts and at the same time burns any carbonic oxide which may find its way over from the furnace. When the setting is hot enough to ignite the carbonic oxide gas without aid, the furnace is filled, and we commence making carbonic oxide, at the same time opening the secondary-air ports wide. When the gas is burning steadily, we pull down the hob, close the opening, and commence to adjust the primary and secondary air. With my reservoir of coke above the curtain, it is only necessary to fill the furnace every six hours, when at maximum working; and I feel this is a great advantage over the ordinary producer, which has to be filled every two hours, or at even shorter periods—admitting large volumes of cold air to the setting, and generally disturbing the quality of the producer gas and the steady working of the setting. Besides this, we have a constant head of coke, against a varying head in the ordinary producer; and I have no doubt that the ordinary producer, when burned down, is often giving off a good deal more carbonic acid than is generally expected. This is evidenced by the intense heat which is frequently seen in the top of a producer before firing. My producers at the top never exceed a dull red, and are generally nearly black.

We clinker our furnace every twenty-four hours, except week-ends, when we miss Sunday—the furnace then going forty-eight hours. I think I may say, without fear of contradiction, that this is the most severe work our stokers have to tackle. Although I have certainly heard of managers having no clinker whatever, I have been unable to arrive at this happy state of affairs. We use no steam—only as evaporated from the ashpan. When this work has to be carried out in a confined pit (which is usually constructed of dimensions which enable the man to bark his knuckles), it is a most uncomfortable job, and often leads to inefficiency in this very important item of carbonizing. While I do not assert that clinkering our furnaces is an arm-chair job, I do contend that it is comparatively comfortable, compared to clinkering in a pit. We have ample room to do our work; and the close, suffocating heat from which the man in the pit cannot escape is entirely absent. The result is that clinkering our furnaces is not considered such a bugbear as clinkering in a pit, and we have no difficulty whatever in keeping them efficiently clinkered.

When we have pulled down the hob and allowed the setting a couple of hours to get into its stride, I commence taking tests of the producer gas with an Orsat apparatus, and the vacuums with an "Evertrusty" draught indicator; and I work away testing and adjusting until the setting is to my liking. I may state that, in my opinion, where generators are in use, apparatus for analyzing the gases is indispensable. I feel sure my apparatus has repaid the Company over and over again. The ease with which a defect is detected and traced saves much time; also a lot of half-carbonized coal, with low makes per ton, which occurs when our heats fall, as they at times will. I regularly test my furnace and waste gases twice a week; and when anything is wrong I go on testing constantly until the defect is found and remedied.

Below are a few of our (with one exception) best analyses for the past year of producer and waste gases:—

Producer Gas.

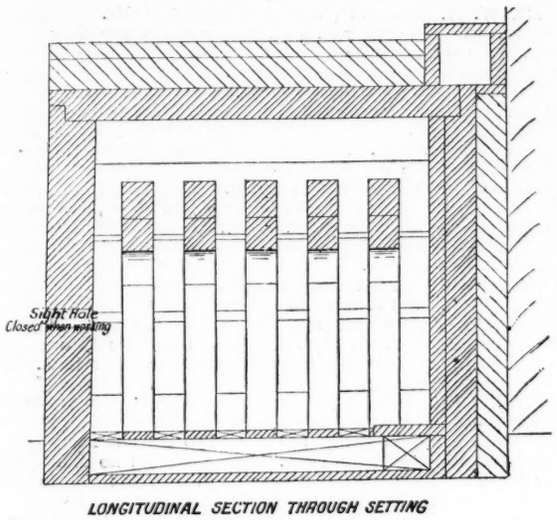
No.	CO_2.	CO.	O.
1	6·8	23·5	0·1
2	7·3	22·7	0
3	6·8	21·3	—
4	7·7	20·4	0
5	10·9	14·9	1·4 heats poor.

Waste Gas.

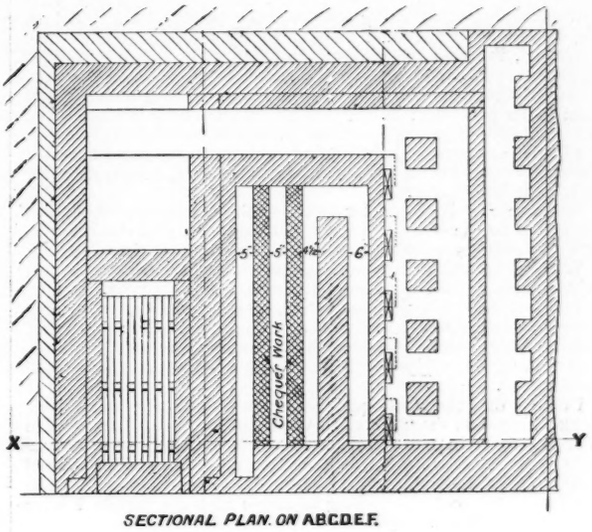
No.	CO_2.	CO.	O.
1	18·8 ..	Nil. ..	0·4
2	19·2 ..	,, ..	0·2
3	19·0 ..	,, ..	0·5
4	18·6 ..	,, ..	0·6

It will be noticed that No. 5 analysis of the producer gas is very poor. When this result was obtained, my heats had fallen away, although, as far as could be seen by the eye, the furnace was all right. This analysis, however, pointed to the furnace being wrong; and on closer examination, after dropping the fire, we found that clinker had formed on the front wall, just above the clinkering door, and out of sight and reach. This was formed by air getting into the furnace over the top of the drip plate, and combustion taking place at that point. This clinker, by holding up the coke, left a space, and allowed the air too free a passage through the furnace, with the result shown above. On removing this, my heats immediately began to improve. I think this emphasizes my point as to the necessity of using an apparatus for testing gases in place of trusting to the eye, as I believe is done by a good many members present.

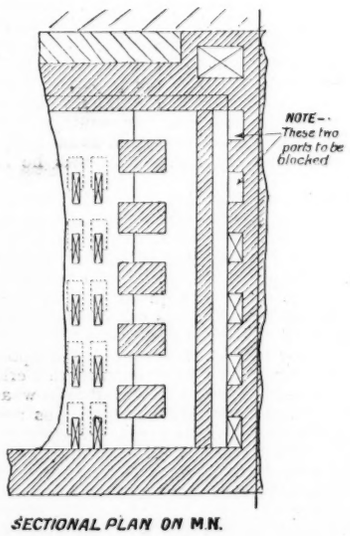
When I took over the Fermoy works, we were a good deal troubled with stopped ascension pipes and pitchy hydraulic mains. It may be mentioned that our gas, tar, and liquor all flowed to the condensers in one pipe; thus we always had a tar seal. I thought this would have a good deal to do with the stopped pipes; but as I was unable at the time to make the necessary alterations, I had to turn my attention to some other means of abating the nuisance. I have already stated that we have a good equal heat throughout the whole length of our retorts. This, I believe, was the chief cause of our stopped pipes; the retorts being very hot right up to the mouthpiece. I partly closed the front gas and air ports, thus reducing the heat at the front, and the trouble ceased; nor has it yet returned, and we have had no occasion for this reason to alter our method of carrying off our gas, tar, &c.



LONGITUDINAL SECTION THROUGH SETTING



SECTIONAL PLAN ON ABCDEF.



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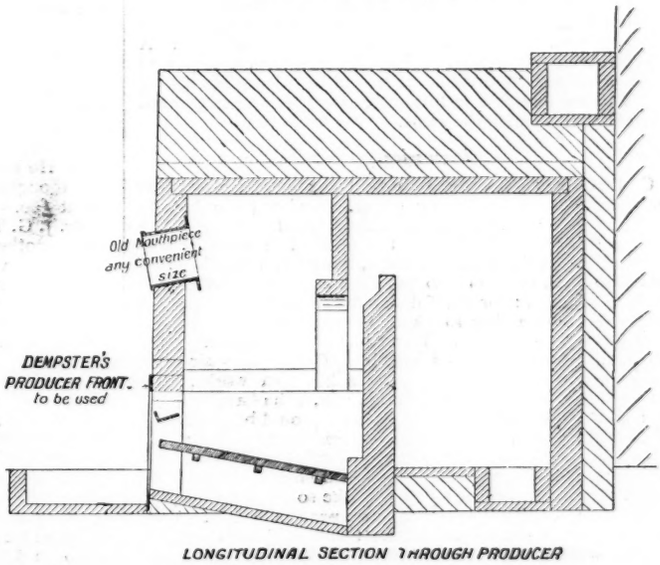


LONGITUDINAL SECTION THROUGH PRODUCER

But, for other reasons, we have in contemplation the fixing of a device to ensure a liquor seal. I keep a couple of twisted augurs to just fit the ascension pipes; and one of these being well inserted at each charge, thoroughly scours out the bottom portion of the pipes. I am of opinion, from my own observation, when visiting other gas-works, that sufficient attention is not given to the augur. I have often seen them of less than 2 inches diameter, which are expected to clean out a 5-inch pipe. Instead of doing so, however, they merely punch a hole through it; and thus they have a 2-inch pipe to commence the charge, and considerably less by the time the charge is half worked off. An augur, to be effiecient, should be kept to just fit the pipe; and as it gets worn down it should be drawn out or replaced.

We managers of small works are without doubt at a great disadvantage, compared with our brethren in larger works, in the process of carbonization. A large works has very little occasion for "standing off," as the manager can, as his requirements demand, take most of it up, by firing another bed or quenching as the case may be. With us smaller fry, most of this has to be borne by one bed. For instance, I have a bed of six retorts, which in winter time makes over 42,000 cubic feet per day, and reduces in summer to nearly half that amount. We are thus enabled to work our bed at something like its maximum, and therefore most economically, for a very short time only—viz., before lighting and after quenching additional settings. There is no doubt this is a great drawback to us. Most managers situated similarly to myself elect to make what gas they want each day at a high heat and then bank-down the fire and allow the retorts to stand idle. When there is this tremendous wear and tear taking place, the retorts open at the cracks, with the result that a good deal of gas escapes into the setting on restarting. There is also the waste of fuel taking place during the time the bed is idle.

I am of opinion that a much more economical way to deal with this is to regulate the heats to enable us to keep our retorts constantly at work. I do so, and consider I get as much gas into the

holder as the manager who works off and on. I also obviate the wear and tear of settings standing idle, and keep my fuel account down.

Below I give the carbonizing results obtained from my works during the year ended April 1, 1905:—

Coal used	1,157 tons 17 cwt.
Gas made	11,578,500 cubic feet.
Gas made per ton	10,000 ,,
Coke made	16,235 cwt.
,, used as fuel	4,835 ,,
,, for sale	11,400 ,,
,, ,, per ton of coal carbonized	9·84 ,,

For the time when the producer setting was worked alone, the coke sales averaged 10·3 cwt. per ton of coal. The coal carbonized was Pelaw Main slack; and the laboratory test, as given by the colliery proprietors, shows, on distillation, a yield of 10,800 cubic feet per ton of 16-candle gas and 70·1 per cent. of coke.

I should here mention that the additional settings used were a six-bed and a three-bed, direct fired. The six-bed was in very bad condition, being badly constructed; the flues were choked, and impossible to get at. I am glad to say, though, these are now abolished, and we have installed, in place of them, two settings of six retorts, each 21 inches by 15 inches by 9 ft. 8 in., with an external producer at either end. We can heat either or both settings from either producer; and we shall thus be able to work one bed right out without letting down for repairs to the furnace, as, when the furnace requires repairs, we can place a ready luted tile over the transverse flue at the back of the furnace, preparation for which has been made.

We have also fixed a boiler on top of these settings, which will be heated by the waste gases, and provide steam for the furnace, and also partly supply steam to the engine to drive the exhauster.

With the old direct-fired settings abolished, I feel confident of selling quite 10 cwt. of coke per ton for the present year.

The cost of this installation, which includes foundation, raising the retort-house floor 2 feet to escape the flood, boiler, buckstays, and hydraulic main supports (no other ironwork), was £300, which, after taking away £50 for the boiler, works out at £20 8s. per mouthpiece.

I take it that the whole question in gas making, as in most other things, hinges on the "£ s. d." Well, the beauty of this system is its simplicity in construction and working; and at the risk of being accused of prating, I contend that there is no better system on the market to-day than the setting I have the pleasure of working, as per the cost of installing as above and the results I have been able to attain.

There is one thing, though, I might be allowed to mention before closing; and it is that whatever class of setting we adopt we must patiently persevere with it until we thoroughly understand it. A setting is much like an engine. It must be cared for, coaxed, and not driven; and each individual manager must learn his setting himself. Outside advice is of little use, as very few settings, even of like construction, work the same.

Discussion.

Mr. C. B. Outon (Inchicore) thought the author was to be congratulated on his interesting paper, showing them how to arrive at good results by a comparatively simple setting. The figures appeared to indicate that the method of working was highly efficient. He did not consider, however, it would commend itself to those of them who had experience with hand-fired regenerative furnaces; for they deemed one of the features of their method to be ability to charge the furnaces direct from the retorts with red-hot coke. There was also the benefit to be derived from the absorption of heat by the secondary air from the waste products of combustion. In his own works, with retorts in sixes, of which he had five in a row, he had ample space in front; and the cleaning out of the furnaces could be performed with comparative ease, owing to the furnace being some 7 feet below the charging level. Clinkering was unknown in his works, except in instances where the air supply had been neglected. He was much struck at the high yield of coke sold per ton of coal. In his own case, it did not exceed 9¼ cwt. per ton of coal. They were in the habit of passing their coke through 1½-inch screens. In some gas-works they shovelled up everything; and this might account to some extent for the good results obtained. The paper was teeming with useful hints, and, he felt sure, would reward a more careful perusal.

Mr. J. Richmond (Kilkenny) said he had a setting similarly arranged, but on a more elaborate scale. It was an installation of twelve retorts in one bed, heated by side producers, something similar to those described in the paper. He had only had it at work for about five months, and he was not in a position to give any particular data as to its efficiency. During the first few weeks, from a green bed they did not expect to get results anything startling; but it promised to heat well, and at the present time they were able to sell about 10 cwt. of coke per ton of coal carbonized. When the bed was in full working order, possibly they might exceed this. In comparison with other works, 10 cwt. of coke was a very fair average to have. Actually it amounted to this, that the importance of these modern settings consisted in the amount of fuel they saved. There was one point in this setting—that was its cheapness—in considering any comparison with what were termed modern regenerative settings of retorts, some of which cost somewhere about £50 per mouthpiece with ordinary beds. Mr. Tooms had had his work done at the reasonable sum of £20 8s. per mouthpiece. This was a consideration. In the case of the larger installation which he (Mr. Richmond) had, he had just made up a return; and it worked out at only £40 12s., including all mouthpieces, iron-work in connection with the setting, buckstays, and ascension pipes. Another consideration was that there was not the excessive heat for stokers to stand. He was in a works recently, with splendid modern regenerative settings, and really to go into the subway was oppressive. In the firing of producers, the difficulty of firing with hot fuel was more apparent than real, because, as a matter of fact, in the construction of the side producers they had a uniform depth of fuel, which was always in a state of incandescence, and the cold fuel that they fired was on the top of it; and the fact of firing with cold fuel did not detract from the heat of the settings. There was another advantage in this setting besides its cheapness, and that was the fact that they generally required no excessive excavation. As a matter of fact, 2 feet down was sufficient for the setting which he had.

Mr. W. H. Roberts (Newtownards) asked Mr. Tooms if a setting, with the arch 7 ft. 6 in. wide and the producer at the side, did not necessitate a larger retort-house to give the same number of retorts as in the other way. They must lose a certain amount of space with the producer between each setting; and, in his opinion, if they took 2 ft. 6 in. more of a retort-house for every setting, it would counterbalance any saving they would expect in excavation. Another point mentioned was having to close some of the port-holes for the gas and air for excessive heats and choked ascension pipes. This meant practically losing a certain amount of the space of the retort, because the carbonizing power of it was reduced. In an instance in which he had experience of this kind, they could not keep 6-inch ascension pipes clear. They increased the ascension pipes to 8 inches; and from that day onward they never had any choked pipes. He thought it might be suggested that this would allow them to get a higher heat for the whole length of the retort; and, with a wider ascension pipe, he believed they would overcome this difficulty, and give more working space to the retorts. His retorts were 10 by 12 or 15 inches.

Mr. J. Brodie (Omagh) had read the paper with interest; but it was a case of everyone finding the best for himself. He had noted one or two things. It was said to be only necessary to fill the furnace every six hours. He had found no difficulty in working an ordinary producer run every six hours; and his heats were constant. His retorts were heated equally all over the body. He clinkered the furnace every twenty-four hours. Twice this year he had run for a whole week—simply shook the bars, and, with no other effort, the fire was quite clean. He did not use steam. He had a subway, 7 ft. 6 in. deep, which was a fairly airy place, and he did not find it excessively hot. He sold over 10 cwt. of coke per ton of coal. This was with regenerators. There were some very good hints in the paper, with regard to the keeping of the flues clear, and other matters, which were apt to be forgotten in working. The cost per mouthpiece was very low. He was adding £5 per mouthpiece and ascension pipe, and still thought that this was very low. The ones he had cost about £60.

Mr. J. G. Tooms (Waterford) said that, as had been remarked upon another question, the whole matter depended upon £ s. d. Here was a gentleman with an expensive setting costing £60; and another, with a much lower cost of setting, selling nearly the same quantity. It required no special pleading to show any body of gentlemen that it was only a question as to whether the difference in the value of the coke was sufficient to pay interest on the extra expense of the setting, and whether the setting could be easily and economically worked. There was another point which rather confused this question in taking the relative merits of the two settings. In one setting they had no attempt whatever at recuperation; in the other, they were abstracting as much heat as they possibly could from the waste gases. Now, he was sorry they had not figures upon this point. No one had any information to give them to show what quantity of coke could be sold if the heat units in the waste gases were taken out, as they could be taken out by heating the secondary air. This, however, had not been done. He must confess that when he first came into contact with such producers, he was not at all in love with them—in fact, he would have preferred other settings. But they were there, and he had to tackle them; and now he was in the position that he did not know anyone else with generator settings, without any regeneration or recuperation, who was able to get better results than he was. He had sold 9·77 cwt. of coke per ton of coal carbonized, no breeze included. He should mention, not for the sake of argument, but many of them who visited his works two years ago would have observed that the tide rose right level with his floor; and he maintained that they were working under exceptional difficulties, inasmuch as they had water even up to within a few inches of the bottom of the flues, so that they were losing more heat than was usually lost by downward radiation. He should be glad if it were possible for him, without much expense, so to arrange his settings as to take advantage of the heat which was lost by not adopting regeneration, because he had read that, in one case, the waste gases in a regenerative setting were reduced from 1200° to 600° Fahr. In the case of Fermoy, he understood, the waste gases would be used for another purpose—that of generating steam in the boiler which was placed on

the top of the settings. He knew of no setting of a similar size to Fermoy, which gave anything like the same results with so inexpensive a setting, or so easily.

Mr. T. FRIZELLE (Holywood) said the paper was a practical one, and went home to most of them, as it contained such a number of hints as to the working of generator furnaces. He thought that the reason for the erection of outside producers was to avoid trouble with water. Water was a great bugbear to most gas managers who had works situated in low-lying districts; but it could be overcome if it were tackled the right way. He was in much the same position as Mr. Tooms, of Waterford. The tide rose and fell pretty near the works; and to enable him to cope with it, he had a shallow regenerative setting. The outgoing tube was as black as his hat. He obtained a good heat all through; and he sold over 10,000 cubic feet of gas per ton, and over 9 cwt. of coke. They came up 3 feet and went down 18 inches, and put a concrete end into that. The result was that the water did not trouble them. They sunk two sump-holes—one at each end of the retort-house—and by means of a pump driven by a shaft from the engine, he kept the subway as dry as a bone, even when the tide was up. He held that they could not get the results from a generator setting that they could from a regenerator, because the outgoing flue from the regenerator setting must be about the same heat as the bottom retort. In the parallel flue in the generator setting, the heat was all taken up with the secondary air; so that it rather surprised him to hear Mr. Tooms say he considered there was no better system on the market to-day than a generator system. He could not say that, even with his own setting. Before he fixed upon the setting he had, he travelled through both England and Scotland; and he chose what he considered the best at the time. Mr. Tooms's might be the best generator system. The make of gas per ton of coal at Holywood during the last two months was over 11,400 cubic feet; and they sold 10 gallons of tar per ton of coal.

Mr. R. YOUNG (Youghal) said he had thought the subject was so threadbare that there was nothing in it at all, but there seemingly was something in it yet. All his coke was sold by weight, in half hundredweight and hundredweight lots; and it had to go through a 1½ inch mesh. If it were all weighed, he could bring up the average. As to the putting of the boiler on the top of the settings, it had always seemed to him that a great waste of heat went on in gas-works.

Mr. J. G. TOOMS said it seemed to be the general impression that this particular setting could only be erected as a generator setting; but it was as well that it should be understood that it could be erected as a regenerator. They had not thought it worth while, for the extra hundredweight or other quantity of coke they could get by regeneration, to go to this expense; but he believed that if they did, it would more than repay the extra outlay. He thought this generator setting could easily be applied to the regenerative system.

Mr. D. W. TOOMS thanked the members for the kindly manner in which they had received his paper. It was a maiden effort; and he had no doubt there were mistakes in it which might have been avoided. There was an advantage in drawing the cold coke from the retort direct to the furnace, but, of course, this might be one drawback to their system, although they did not count on it, because the coke had fully six hours to get heated up before it came down to the combustion part. They had fixed two beds of sixes, with two furnaces—one at each end. One furnace would heat either twelve retorts or the six. This meant having a setting which would never be let down till it was thoroughly worn out. Therefore the cost of letting them down and getting them up was avoided; and, consequently, he expected that it would last much longer than an ordinary setting. On the question of recuperation, they had fixed the boiler on the top of the setting, and conducted the waste gases under the boiler, from which they got ample steam to supply the furnaces, and also to drive the exhauster. Since he put the steam under the furnaces, he had absolutely no clinker. Mr. Richmond had undoubtedly gone ahead of him in cost per mouthpiece; and he was to be congratulated on it. Mr. Roberts drew attention to the size of the retort-house owing to the putting of the producer at the side taking up more space. Most of them, he thought, had ample room in their works—that was to say, a couple of feet, or even 4 feet, in five furnaces, was of little difference to them. In regard to the reducing of the heat in the front of his setting, to obviate stopped ascension pipes, he seemed to have taken more than he (Mr. Tooms) intended him to take. He certainly did not reduce the heat to the extent of stopping gas making—he only reduced the excessive heat. He was very much surprised to hear from Mr. Brodie that he was able to charge an ordinary generator to last six hours. He thought that, at the end of six hours, the analysis of the producer gas would be very interesting reading. He quite agreed with Mr. Frizelle and several other speakers that regeneration was necessary—that the waste heat should not be allowed to go to waste; but those settings had never been tried with regeneration, and he thought he had used his waste heat in such a way as that he need not worry himself about the heat of the waste gases. He still contended there was no better setting than his own in the market to-day—that was, without recuperation. He had not the slightest doubt they might save another 5 per cent. of coal by recuperation; but it was his case that recuperation did not pay, because, after getting up and letting down once or twice, the furnace began to leak. Personally, he had never had experience with regeneration; and so he could only speak from hearsay.

The PRESIDENT (Mr. G. Airth) thought they must all compliment Mr. Tooms extremely on his maiden effort. There were many fine points in the paper, and he thought Mr. Tooms must feel that he had not written it in vain.

GASHOLDER STORAGE QUESTION.

[A Discussion at the Annual Meeting of the Irish Association of Gas Managers.]

Mr. R. B. ANDERSON, of London, introduced a discussion upon the proposition—"That, in view of the increase in the day consumption which has taken place of late years, 60 per cent. of the maximum daily output may now be considered sufficient gasholder storage." Mr. Anderson began by explaining that it was thought that the proceedings would be a little too short, and that, consequently, they might have a discussion. He considered they should have a highly contentious question for discussion; so he chose the subject of the amount of storage it was essential they should have; and considering the matter, he arrived at the conclusion that 60 per cent. was an adequate supply before any person should contemplate extension. He then submitted the following introductory paper.

The rule of twenty years or so ago used to be that gasholder capacity should equal the maximum twenty-four hours' issue. It was a fortuitously neat assertion, easy to remember and full of association, which perhaps had much to do with its acceptance. It is difficult to see how it was arrived at, as no calculations appear to point to the result; but it worked out well in practice, and its correctness may therefore be assumed. In interpreting it, one read it to mean that until the daily output outran the holder capacity the day had not come to extend. As soon as they overlapped, then a new and larger holder, equalling the aggregate of all the others, was to be recommended. Thus the limits of working were from double the daily output as a maximum to equal the daily output as a minimum. The manager whose Board found him holders on these lines had little to complain of, and should have been comfortable.

During the past twenty years or so great strides have been made in extending the hours of heavy consumption; and it becomes of interest to consider how far the above rule should be relaxed. From experience in several different-sized works in Ireland, and from calculations, I am led to consider that increased storage is advisable when the holder capacity is no longer as much as 60 per cent. of the heaviest twenty-four hours' output.

Before dealing with present requirements, let us consider what storage was provided for in the old days, and how circumstances have changed. First and foremost, holders were required to take up the daily load-factor and enable gas to be produced regularly, although consumed so very irregularly. If this were the only reason, one could arrive at the requisite capacity, with precision, by observing the hourly make and issue; and assuming, as used to be practically the case, that the stock decreased for about eight hours—say, from 3 till 11 p.m.—and that the gas sent out at other hours was negligible, except in towns where the public lighting was done lavishly, one could see that the holders should accommodate at least two-thirds of the twenty-four hours' issue.

There were other causes, however, rendering a margin advisable, set at the balance of maximum twenty-four hours' issue. Having a reserve of gas would often enable one to get over the few heavy nights of mid-winter without having to fire an extra setting—so saving coke and wear. Furthermore, if holder room be ample, with full holders a setting could often be let down a week or a fortnight in the spring before the remaining benches would equal the daily output; the balance being drawn from stock. And, similarly, firing up could be staved off for a fortnight or so in the autumn—thereby economizing coke and saving wear. Another reason was the necessity of letting retorts be scurfed, and there were other factors which could in no way be measured—the risk of accident, unreliability of heats, untrustworthiness of men.

Now, during the past two decades, great changes have occurred. Men are much more trustworthy. Temperance, better nourishment, and improved physique generally have worked an improvement in stokers. Whereas Christmastide used to be looked forward to with some dread by gas managers, for many years past they have had to chronicle that Christmas passed with no trouble from the men. Retort-settings nowadays are much more reliable, partly due to better treatment by better men, partly to superior construction, and greatly to the introduction of gaseous firing, which ought to be used more or less in every gas-works, however small.

The risk of accident is also much reduced. The superior man has survived or been introduced as gas manager, and he looks further ahead to prevent accidents, which are now seldom imminent. The much-in-demand handy-man, who used to obtain a position as working manager from the way in which he bent his back on a Sunday to repair the accidents of the week, is not now so greatly run after. Cautious, far-seeing men, not perhaps so robust, are selected for managerships, and accidents are prevented instead of cured. Scurfing of retorts is not so great an operation as it used to be, and does not need to be done so frequently, owing

to the better working of the exhausters. So much for the less definable reasons.

As to saving of coke and wear—these are subject to measurement. But here also improved working and design have reduced very greatly the cost of running a bench for an extra week or two. Wear, especially with gaseous firing, may be considered negligible. It is the lighting up and quenching of a bed which harms it. A few extra months' action is neither here nor there. Fuel used per week by a bed is about half what it used to be twenty years ago. Thus less coke can be saved per annum now to go towards paying interest upon extra holders. As to the daylight issue of gas, whereas holders used to stop rising from about 3 to 11 p.m., now some managers find they rise only between 11 p.m. and 7 a.m.; resting fairly stationary from 7 a.m. to 3 p.m. when they fall, as of yore, during lighting hours. Furthermore, there is an appreciable consumption going on now between 11 p.m. and 7 a.m.

Thus, considering variations in issue only, holders need be provided to store at the outside one-third of the maximum twenty-four hours' output. Formerly, this same sum was added to the theoretical necessary, as a margin. Assuming the same margin, we arrive at two-thirds the maximum twenty-four hours' output; and, making some deduction for the minor points referred to above, we are warranted in concluding that no manager should ask his Board to increase the storage capacity so long as he has 60 per cent. of his maximum daily output—presuming, of course, that he has worked his district in an up-to-date normal manner for day consumption.

I give you the following holder capacities and maximum twenty-four hours' output of half-a-dozen Irish works with which I am connected; and in no case has any serious difficulty been found in getting over Christmas, although in two cases extensions are imminent:—

Maximum 24 Hours' Issue.	Holder capacity.	Percentage.
370,000 ..	277,000 ..	75
99,000 ..	84,000 ..	85
77,000 ..	49,000 ..	63
26,000 ..	11,000 ..	42
25,000 ..	15,000 ..	60
14,000 ..	19,000 ..	135

In conclusion, a few words as to the cost of holders. I have recently erected the following tanks and holders in Irish works, and give you their costs:—

Tanks.		Holders.	
33 ft. 6 in. × 10 ft. 6 in. . .	£203	16,000 cub. ft.	£296—2 lifts.
41 ft. 6 in. × 14 ft. 0 in. . .	282	17,000 ,, ,,	297—1 lift, ready for two more.
55 ft. 6 in. × 14 ft. 6 in. . .	405	54,000 ,, ,,	953—2 lifts, ready for one more.
88 ft. 6 in. × 18 ft. 6 in. . .	1500	277,000 ,, ,,	2450—3 lifts.
		17,000 ,, ,,	375—2 lifts.
		32,000 ,, ,,	568—2 lifts.

Assuming capital has to be raised at 6 per cent. (which is a fair average for an Irish gas-works), one sees that the cost for interest alone on the tank and holder works out at about £30 a year for 16,000 cubic feet in the smallest one given; at about £35 for 17,000 cubic feet in the next; and at about £80 for 54,000 cubic feet in the third case. These are appreciable sums to be recouped, even if capital is obtainable at that rate. Depreciation, painting, &c., have all to be taken into account, so that one must be able to show in a medium-sized works a consequential saving of about £100 a year before it is worth while embarking on gasholder extensions. Besides, these can generally be staved off with advantage until repairs become necessary on old holders, when a new large holder should be built, and the old ones left derelict for a few years, to be repaired when wanted.

Discussion.

Mr. J. G. TOOMS (Waterford) said he had some rather voluminous notes in opposition to the proposed 60 per cent.; and he hoped to convince the members that this storage was too small for any gas-works to be profitably and successfully conducted. He thought the matter might be considered in two stages. The storage must be sufficient, along with the probable make during the heavy consumption, to tide over the heaviest issue—from dusk to midnight—and leave a safe working margin from November to February; and it must also be so much in excess of the above quantity as to allow the regular working of the retorts, without any stand-by, and for the fluctuations in gas production due to different causes. The latter, to his mind, was the vital question. He found that at the Waterford Gas-Works, where the day consumption was at least above the average in Ireland, 35 or 40 per cent. of the maximum consumption took place from 4 p.m. to 7 p.m., and about 62 per cent. between 4 p.m. and 10 p.m. The steady make of gas would be about 4 per cent. of the maximum daily output. Thus, at 10 p.m., assuming that the gasholders had been full at 4 p.m., they would have in stock a quantity of gas equivalent to about 23 per cent. of the maximum day's output. He said, assuming the holders were full at 4 p.m., should it come on dark at half-past two or three o'clock, instead of having 23 per cent., the amount of gas in stock at 10 p.m. would be reduced by something like 15 or 20 per cent.; bringing down the available gas in the holder at 10 p.m. to something between 5 and 8 per cent. He was allowing for the hourly make of gas in the time. In his opening remarks, Mr. Anderson said that "considering variations in issue only, holders need to be provided to store at the outside one-third of the maximum 24 hours' output. Formerly, this same sum was added to the theoretical necessary, as a margin. Assuming the same margin, we arrive at two-thirds of the maximum 24 hours' output." So far as he could see, if the 60 per cent. adequate storage were to be based on this statement—and he thought that was the foundation—with some of the figures he had already used, he would not have much difficulty in showing the members that the foundation was not good. He wanted to draw particular attention to the outside storage requirement for variations of gas consumption, which was put by the author at 33 per cent.; and he would apply this to his own experience. He required for consumption from 4 p.m. to 10 p.m., 62 per cent. To the author's 33 per cent. he would add the gas made during six hours—say, 25 per cent.—which would give 58 per cent., or 4 per cent. less than the required quantity. If it were dark at 2.30 p.m. or 3 p.m., the available gas would be increased to 63 per cent., while his requirements would be increased by (say) 14 per cent.—making a total of 77 per cent., which would leave a deficit of 14 per cent. He thought this showed clearly that not only were the author's conclusions based on an erroneous supposition, but that 60 per cent. could not be considered adequate storage, under ordinary conditions. There was another matter to consider. He had been supposing that there was no such thing as the wet, foggy, damp weather that they had—continuous days in which the consumption of gas was abnormal. In that case also there were little things that cropped up, even in the best regulated gas-works, which entailed a stoppage of gas-making; and with 60 per cent. storage it would be impossible to maintain an adequate supply. But there were also such things as low heats, without any apparent reason. Even with the perfect settings Mr. Tooms had at Fermoy, he did not think he would say that he had never had low heats. These things must be taken into account in connection with what might be called the continuity of the supply of gas, because, coal being wet would not be considered a sufficient excuse for the town being in darkness at eight or ten o'clock at night. There was yet another aspect of this matter of the storage capacity of gas-works. He had shown that, for Waterford, 60 per cent. storage would be sufficient, provided that the holders were full every afternoon or evening. To obtain this, however, would upset all their regular working in the retort-house. On bright days, the retorts would be allowed to lie idle; but on dark days they would be worked for all they were worth, and the results in gas made and coke sold would suffer. The more regular and constant work they could give their retorts the better. He might be told it was a very common experience, in small gas-works, to temporarily suspend gas supply owing to the reasons stated; but it was a serious matter, which could not easily be computed in £ *s. d.*—the estimating of the loss through an irregular and inadequate supply of gas. He should like to ask whether Mr. Anderson could inform them how often during the three months of November, December, and January, the holders at the works referred to as having less than 70 per cent. storage had been actually grounded, and how often the pressure had had to be reduced. He had some knowledge of a similar case, where, he was aware, the gasholders had been grounded, not once, but many times each winter, and the pressure was systematically reduced—in fact, there never was a full supply, except on Sundays. He ventured to say that if Mr. Anderson had had the experience of counting rivets of gasholders, from six to eleven o'clock, and the anxiety and strain of keeping up the supply of gas, he would hardly advance the proposition that 60 per cent. of the maximum day's output was adequate storage for any gas-works. He would like to state that Waterford would be a favourable place for low storage, because there were no manufacturing works. Although he would not say that they required the same storage as was considered necessary twenty years ago, he said emphatically that 60 per cent. was too little for safe, economical, or comfortable working, or adequate constant supply to the consumers. This was his contention.

Mr. R. G. SHADBOLT (Grantham) said, by way of pitting himself against Mr. Anderson, at once and in the most emphatic way, as a working Gas Manager, he should decline to work at a standard of 60 per cent. He asked, if they were to put it to a committee of gas managers, members of the Association, who might be called upon through the exigencies of their conditions to deal with such a question, let them compare notes of their experiences, and leave the verdict to them; and they would find that they would not only reject the notion of 60 per cent. storage, but that they would adhere to the old standard of a storage at least equal to the maximum day's consumption. Mr. Anderson had set out his case very temptingly indeed. This was all very well from a debating point of view, and he could quite appreciate the motive of Mr. Anderson in bringing forward the subject in the manner he had done. He thought a discussion of this sort would be good for all of them. But do not let the conclusion they arrived at in their debate be taken by them too seriously. If Mr. Anderson succeeded, they would have hypothetical gas-works, hypothetical plant, and hypothetical conditions everywhere. This would be all perfect, assuming that the gas supply was also hypothetical; assuming that there was no such thing as naphthalene; assuming that there were no such things as syphons and condensation; assuming that there were no such things as faulty pumps, sudden cracks, or back-pressure; assuming that there were no such things as thick tar, faulty retort-benches, and

collapsing retort-houses; assuming there were no such things as snow storms and snow drifts, gales, and national holidays; assuming that there were no such things as Mondays; and assuming many other things which affected their work, then he said Mr. Anderson's 60 per cent. of storage would be sufficient. But that was all assumption—and some of it, indeed, presumption. He was talking quite recently to a very old gas manager who had occasion last year to increase his storage. His conditions of supply were such as Mr. Anderson referred to—that was, a supply spread somewhat equally over the twenty-four hours. He put it to him what was his percentage of storage, for an output of somewhere between 35 and 40 million cubic feet. This manager said his storage had been 70 per cent.; but he had increased it until it was now 124 per cent. When he put it to him what margin he thought he had, the manager replied that, for safe working he did not think he had more than from 15 to 20 per cent. margin. This was not his (Mr. Shadbolt's) idea; it was that of a man who had had experience. So that they saw there was a great deal of difference between a hypothetical gas-works and the actual—there was as much difference as there was between a hypothetical tenant and the actual tenant. Another matter to be considered was the size of their regenerating unit. He could imagine Mr. Richmond lighting up a bed of retorts like his, with 60 per cent. storage, at the commencement of winter, with the result that, in about two days, his holders were full, and he had nothing for his plant to do, because he had 60 per cent. storage. But he would soon find that it was as much as he could do to keep up his supply. He would have his holders full, and he would look round and, seeing it was a fine day, he would let down a bed of retorts. What would be the result? He would drop his holder too; and if it should happen to become a cloudy day, he would likely drop his consumers as well. He did not think Mr. Anderson had taken sufficient account of this. There was one other thing he (Mr. Shadbolt) would like to say, and it was that, not only had they one maximum day to think of, but sometimes they had three or four such days in succession. If they could commence with their holders full at the beginning of each evening, there was no doubt at all they could do with less holder capacity; but it was possible that some untoward event might occur, which would interfere with the even tenour of their manufacture. And, given the condition that they had already passed through one maximum day, and started upon a second, and some of these untoward events were to occur, where would they be? They must provide against accident. In these things they must be guided by experience; and nothing but experience would teach them. Although the burden on the twenty-four hours might be more regularly distributed than it used to be, they had not only to keep up the maximum supply for one day, but, in some instances, they might have to keep it up for two or three days. In such a case they could understand the feelings of a gas manager who was called upon to deal with a 60 per cent. storage.

Mr. W. H. Roberts (Newtownards) said he might give them a little experience of his own when trying to supply gas with 60 per cent. storage. He had 62½ per cent. at the time. They had an output, on an average, of 120,000 cubic feet daily. His storage was 75,000 cubic feet. He got on nicely while the weather continued as it was; but it did not continue. The dark days came. At that time, fortunately, he had been working his retorts at their maximum, else he would have been landed—along with the holder. His output increased from 120,000 to 150,000 cubic feet; and if he had not had extra retorts to put on, he would have been 30,000 cubic feet a day short, unless he had reduced the pressure, which he did not care to do, as it always meant money. Another point was, Did Mr. Anderson mean the maximum daily output on the average, or would an exceptional day's consumption be counted the maximum?

Mr. Anderson: By maximum, I mean maximum absolutely.

Mr. Roberts went on to say that he had a purely manufacturing town to supply, and that the mills fluctuated in every way. His week's consumption was from Monday night till Friday night. He made little or no gas on Sunday. He could safely shut off his retorts on Saturday afternoon, and stop making gas till Monday night, and keep the town going on 60 per cent. of his maximum output. So that he considered it would pay him to have 150 per cent. of storage, because, by doing so, he could work fewer retorts, and the saving, he believed, would be considerably over the interest he would pay on the extra holder; and he would have a great deal easier mind than he had at present.

Mr. J. Richmond (Kilkenny) thought that the heading to Mr. Anderson's remarks had been misconstrued. The storage capacity should be 60 per cent. of the maximum daily output. Why should they not get much nearer the hypothetical than they now had? Men were more trustworthy now; managers were reckoned more efficient; and, as a matter of fact, they were getting nearer the hypothetical. A great deal they had been told on this matter proceeded on the assumption that retorts should be kept more constantly in use. Mr. Anderson, in his hypothetical statement, was assuming an up-to-date gas-works, and an up-to-date modern town, where, as they knew, the output during the hours of daylight, was as great as, or within about 60 per cent. of, that during the hours of darkness. In that case there was no absolute necessity for retorts standing idle. As a matter of fact, the extra storage then became a stand-by, and the holders were acting as a reservoir, and as a means of giving more uniform pressure.

Mr. J. Whimster (Armagh) said the old saying that "circumstances alter cases," was applicable to the question. A 60 per cent. maximum could not be made exactly a fixed rule. In his own case, very strangely, the storage capacity was 62 per cent. of the maximum normal output. He was not speaking of the abnormal days, to which Mr. Tooms and some of the other speakers had referred. The maximum normal output with him was 168,000 cubic feet, and his storage was 104,000 feet. He found that in the height of winter his stock and output worked out as follows: His holders were full at four p.m., with 104,000 cubic feet in stock; he was making 7000 cubic feet an hour; between four and (say) 11.30 p.m., he made 152,000 cubic feet, and he sent out at the rate—not equally all through, but over all—of 15,000 cubic feet an hour, or 108,000 feet in all; so that he lost from stock 56,000 cubic feet during this time. Between then and six a.m., he gained 40,000 cubic feet. He sent out only 6000 cubic feet during that time. Then, from six to nine o'clock, he practically sent out all he made—7000 cubic feet an hour, or 21,000 feet in all. After nine o'clock he sent out much less—about 5000 cubic feet an hour—and gained about 2000 cubic feet an hour, or 16,000 cubic feet, till four p.m. The make during this time was 49,000 cubic feet; so that there was a gain, in these hours, of 33,000 cubic feet. Thus he had 168,000 cubic feet made, and 168,000 cubic feet sent out; and his holders were full, practically, every day at four p.m. If, through dark days or fog, the consumption went a trifle above this, he could afford to lose a little gas, as a rule, all through the week. The Sunday was rather an important item with him. Mr. Anderson did not seem to have taken this into account. He stopped on Sundays. He charged in the morning, and then stopped, and started again at four or six o'clock at night, according as the holders warranted. He could do this all the winter through, except when those abnormal circumstances occurred to which Mr. Tooms and some others had referred, such as dark days, or men drunk, and heats going down unaccountably. He thought that during the whole of last winter he had not to work on Sunday. But, as he said, circumstances altered cases; and he could easily understand that in other towns, which were differently placed to him, it would be different. He had principally a residential and a shop population. There were one or two factories; two of them being lighted with gas. These burned a considerable quantity during the winter. On Saturday afternoons they did not burn any at all; and this seemed to him to balance the extra short consumption on Sunday night. On Monday night, in fact, whatever was the reason, they seemed to have their heaviest consumption. So that, with him, 62 per cent. did very well. But it did not leave any room for contingencies; and he thought, with Mr. Shadbolt, it would be a very bad thing if it went forth to the gas world that the Irish Association of Gas Managers had concluded that 60 per cent. was plenty of storage. Why, the Directors would look at them if they were to ask to have 100 per cent. of storage capacity; but yet he did not think that would be a bit too much. He thought they should not fix their level at 60 per cent., but stick to the old standard.

Mr. T. J. Reid (Ballina) did not think that, in introducing the discussion, Mr. Anderson had any serious idea that the point would be finally and for ever elucidated at this meeting. He rather thought he introduced it so that they might get a good discussion; and he should be thoroughly satisfied with the result. In his opinion, they all knew the influences which determined the question. These influences must vary in every particular instance. The circumstances determined, to a certain extent, the amount of storage. Of course, if they had a constant supply all over the twenty-four hours, a much smaller storage than 60 per cent. would be sufficient. But this condition was not fulfilled in any place he knew of; nor was it likely to be fulfilled. As Mr. Shadbolt remarked, Mr. Anderson did not seem to have taken into consideration the size of the generating units. This would, perhaps, have more force in the smaller works than in the larger ones. Mr. Anderson's proposition was that the storage in a gas-works should be of the smallest amount that would enable the smallest number of retorts to give a continuous supply of gas. There was nothing to be said in favour of Mr. Anderson's contention. Take his (Mr. Reid's) own works. The storage was something like 45 per cent. of the maximum make. This was very small; and he would be content to have (say) double that. But he had only one holder; and he did not see the force of spending several hundred pounds on a new one when he could, with a little expenditure during the year, manage to make the present holder do. It was a question of whether the interest on the cost of providing a new holder would be compensated for by the advantages to be derived.

Mr. Anderson said he was at first inclined to think that all his ninepins would be bowled over; but he thought some of them were standing yet. In putting these figures before them, he knew—he confessed at once—that he really looked upon them as the minimum possible. He expressly stated in his opening remarks that they might work down to 60 per cent., and then start to double it to 120 per cent. He would propose to build a holder that would provide double their maximum output, and then to work till the time came when they would require another holder. He was not able to take in all the figures put before them. When dealing with percentages, they had not only to carry all the figures in their mind, but to consider what they were based upon; and he did not see how anyone could arrive at the 62 per cent. in working without dealing, as had been done very largely, with

the regularity of the working of the retorts. His opinion was that they ought to have a good margin of retort power in the winter time, and not have to depend upon lighting up. If they did have dark weather coming on, that would do more damage than by simply working the retorts up to their full capacity. The question, of course, hinged upon whether the saving in the working expenses would cover the interest and depreciation on the capital expenditure in providing more storage. He was speaking altogether from experience in the South of Ireland; and really he did not think he had been far wrong, judging from what the other speakers had said, because, although they did not agree with him, they did not seem to differ much from him. Mr. Whimster, for instance, was satisfied with 62 per cent. before he sought to increase. Mr. Reid did not agree with him; but, taking his figures, he had actually gone beyond him (Mr. Anderson). It was the amount of the saving they could bring about by having a large holder which should indicate whether they ought to increase the storage or not, because the cost of a new gasholder was a very serious question indeed for them to consider. They had to take into account interest and depreciation on the cost of it, which took a very long time to save, because the greatest saving occurred only at the heaviest week of mid-winter. They certainly did have disadvantages every time they needed to light up or let down retort-benches; but this did not occur very often. As to how often the holder had been on the ground in those works, he was not going to give his friend away. Referring to Mr. Shadbolt's humorous remarks, he regarded the 60 per cent. argument as very suitable for debate. Well, with 62 or 45 per cent., neither of these gentlemen should be at all ashamed of the condition of his works. On the size of the generating unit, he thought he was right. In works such as nearly the whole of them were connected with, the generating unit should be of a particular size. Attention was called to Mr. Richmond's unit of twelve retorts. It would be out of the question to think of lighting it up in the way suggested, shortly before Christmas. There were other units as well which would require to be lighted up. Mr. Roberts raised the question of average and exceptionally abnormal conditions, and what he meant by the figures he gave. He did not mean a case in which they would have a steam-roller breaking the mains, but the time of their absolutely heaviest make. Mr. Roberts did not give them any figures; but he was satisfied that it would pay him to increase to 150 per cent.—that the saving in working would be so great that he could afford to do so. He would like Mr. Roberts to give them some figures for this, because he could not see his way to save the extra cost of interest and depreciation which there would be on the outlay. Mr. Whimster said he did not agree with him; but he certainly thought, listening to him, that his figures were very interesting. He wished they had had more of these figures—actual figures, such as Mr. Whimster gave them. They worked out very clearly in support of his position, because Mr. Whimster was comfortably enough off with 62 per cent. The time had arrived now when Mr. Whimster should increase according to what he (Mr. Anderson) had said. He did not allude to stopping on Sunday. This was a thing he did not feel they could rely upon very much. It only applied in cases where they had a chance of gradually working up their stock. It was only when they had excessive storage that they could afford to lose during the week. As Mr. Reid said, he was thoroughly satisfied with the result; but enlarging the power of the retort-settings was not a very expensive matter. If they had a margin of retort-power, which would only cost from £70 to £80, instead of £1000 for a new holder, they had a margin which would carry them over any serious defect. If they had a few extra retorts, they could at once put on something which would not only make gas, but store it. As he had said, it was a question of whether the depreciation, and the interest on the cost, could be reckoned in the course of the twelve months as equal to the cost of working the extra retorts.

EXTRACTION OF CYANOGEN.

A Comparison of Bueb's and Feld's Methods.

In the "JOURNAL" for Nov. 22, 1904 (p. 619), a *résumé* was given of Feld's remarks in the "Journal für Gasbeleuchtung" upon Bueb's method of extracting and recovering cyanogen from coal gas. This criticism has now been followed in the "Zeitschrift für angewandte Chemie" by an account of an inquiry into the same subject by A. Hand. The author has investigated the composition and behaviour of the "cyanogen mud" obtained in the Bueb process of separating hydrocyanic acid (HCN) from the gaseous products of distillation, especially of coal; and he states that his results differ considerably from those obtained by Feld. If the conditions prescribed by Bueb, especially with regard to the degree of concentration of the ferrous sulphate solution, be maintained, the "cyanogen mud" is obtained as a dark brown mass. This contains: (1) In solution—ammonium ferrocyanide $(NH_4)_4\,Fe\,(CN)_6$, sulphate, carbonate, or bicarbonate, small quantities of sulphide, thiosulphate, and, on an average, about 0·13 per cent. of thiocyanate. (2) In the insoluble portion—an insoluble ammonium iron cyanogen compound, which is the chief constituent along with undecomposed ferrous sulphide, tar, oily substances, ferric oxide from the iron connections and vessels of the gas plant, and mechanical impurities such as sand. The insoluble ammonium-iron compound was really found to be a double compound of ferrous cyanide and ammonium cyanide, $2NH_4\,(CN).\,Fe\,(CN)_2$; and it is usually accompanied by moderate quantities of soluble ammonium ferrocyanide. The amount of cyanogen expressed as prussian blue, $Fe_7(CN)_{18}$, ranges in general from 8 to 15 per cent.

Hand regards the proposal of Feld to use weaker solutions of ferrous sulphate [see "JOURNAL," Vol. LXXXVIII., p. 619] as unsatisfactory; results obtained in practice having shown it to be more advantageous to fix the cyanogen in the form of the insoluble ammonium iron cyanide above mentioned than as soluble ammonium ferrocyanide. He controverts Feld's statement that the recovery of the ammonia in "cyanogen mud" is too complicated a process to be undertaken in gas-works; and he shows that by merely boiling the "mud" (or treating it with acid) the insoluble compound above named is converted into the white insoluble compound (ammonia ferrous ferrocyanide), with separation of ammonia. The reaction proceeds according to the following equation:—

$$3\,[2\,NH_4\,(CN).\,Fe\,(CN)_2] + FeS = 2\,[(NH_4)_2\,Fe_2(CN)_6] + (NH_4)_2S$$

Insoluble ammonium cyanide-ferrous-cyanide + Ferrous sulphide. = White insoluble ammonia ferrous cyanide. + Ammonium sulphide.

or Do. + $Fe\,(OH_2)$ = Do. + $2\,(NH_4)\,HO$

Ferrous hydroxide. Ammonium hydroxide.

If the "mud" does not contain sufficient undecomposed ferrous sulphide for the purpose, a suitable addition of ferrous hydroxide or of sulphide must be made. In presence of sufficient FeS or $Fe\,(OH)_2$, the soluble ammonium ferrocyanide is also converted into the white insoluble compound. After this treatment, three-fourths of the total ammonia is present in the soluble form, and is easy of recovery by the usual ammonia methods.

Coming now to differences in results of analytical determinations, the author attributes them to the various methods of estimation of the soluble ferrocyanide and ammonia in the "cyanogen mud." According to Feld, the "mud," after being diluted with cold water, will not filter clear; and he therefore recommends an addition of magnesium chloride solution. The author finds, however, that by diluting with a smaller quantity of water—such as 50 grammes of "mud" with water sufficient to make a total volume of 260c.c.—a perfectly clear filtrate can be obtained. In his hands, the method of Feld described in the "JOURNAL" gave varying results with one and the same sample of "mud," owing probably to decompositions caused by excessive dilution with water, and favoured by the weakly basic magnesium chloride that Feld introduces.

CORROSION OF IRON WATER-PIPE.

In a recent number of "Engineering Record," Mr. Frank N. Speller gave an account of a portion of a pipe-line which had been in service for a year only, and then began to leak and show signs of active corrosion on the inside. It was a 3-inch pipe, extra strong; and it was inferred at first that the failure was due to soft steel having been used instead of iron. However, analyses of the portion which gave out showed it to be of the latter material. The unusual circumstance led the writer, on hearing of the case, to examine the conditions more closely. The sections corroded were laid horizontally at the top of the system. When opened up, the pitting was found to be confined to a strip of the upper interior surface of the pipe less than 2 inches wide. The water, while apparently still good looking, seemed to have been contaminated by increased quantities of sewage during the past few years. The interior of the pipe showed distinctly in places a glutinous skin of decomposing organic matter. Analyses of the pipe gave the following results:—

Sample from	Outside.	Pitted Surface.	Outside. Opposite Pits.
Silicon	0·190	0·130	0·090
Sulphur	0·018	0·015	0·029
Phosphorus	0·280	0·274	0·275
Manganese	Trace	Trace	Trace
Carbon	Trace	Trace	Trace

The material is evidently wrought iron of average grade. An analysis of the residue scraped from the corroded portion showed the bulk of this to be oxide of iron with some organic matter, considerable combined carbon dioxide, and 0·68 per cent. of sulphur. About 0·15 per cent. of sulphur was combined as ferrous sulphate. The data collected appear to point to decomposing sewage matter as the origin of the trouble. The sulphuretted hydrogen and carbon dioxide produced, probably mixed with a certain amount of air, collected in this trapped portion of the system, and corroded the iron very quickly. Somewhat similar conditions were observed in a natural-gas line where the gas carried 2 per cent. of sulphuretted hydrogen. Some water on the bottom of the pipe kept that portion partially protected, while the damp gas above corroded the pipe seriously. Sulphide and sulphate of iron formed a large part of the rust in this case.

This is one of those cases where a slight change of conditions accelerated the corrosion beyond all proportion. It was not at all uniform, as might be expected would be the case with wrought iron. On the contrary, the pitting was deep, while adjoining

parts of the metal were intact. If the corrosion had been at all regular on the section affected, the pipe would probably have lasted much longer. For a short period iron presents a better appearance under corrosion, owing to a concentration of cinder near the surface. In the case of pipes, experience shows this initial protection to be misleading, as when once the corrosion gains a start, the relative losses are practically equal under most conditions. It would therefore seem that environment is the determining factor in corrosion, compared with which any difference there may be between the relative tendencies of wrought iron and soft steel to rust is usually trivial.

DETERMINATION OF CARBON MONOXIDE IN CONFINED ATMOSPHERES.

For the purpose of ascertaining the extent of the incomplete products of combustion in gas-stoves, Dr. T. E. Thorpe tested the accuracy of Nicloux and Gautier's method of determining the percentage of carbon monoxide. This method, as modified by Kinnicut and Sanford, is based on the observation of Ditte that, at temperatures between 150° and 200°, iodine pentoxide (I_2O_5) or anhydrous iodic acid is decomposed by carbon monoxide into iodine and carbon dioxide, thus—

$$I_2O_5 + 5CO = I_2 + 5CO_2.$$

The amount of the liberated iodine is determined by means of $\frac{N}{1000}$ solution of sodium thiosulphate. The tests of Dr. Thorpe confirmed the claims of Kinnicut and Sanford that the method is capable of yielding accurate results even with air containing as little as 0·0025 per cent. by volume of carbon monoxide.

Employing the same reaction, Messrs. A. Lévy and A. Pecoul have devised a colorimetric means of detection and determination. The air or gas to be tested for carbon monoxide is led first through a filter of glass wool and then through a heated U-tube containing pure iodic anhydride. The iodine set free is carried forward by the gas, and is led through an absorption tube containing some chloroform, carbon bisulphide, or other suitable liquid, covered with a column of distilled water about 8 centimetres (0·32 inch) high, to prevent evaporation. The absorbing liquid (chloroform or bisulphide) acquires a depth of tint proportional to the amount of iodine set free by the carbon monoxide; and the amount of the latter may be readily inferred by comparing the colour with that of a standard solution. When about 4 c.c. of pure chloroform is used as the absorbing liquid, a pink solution is obtained. The volume of air required is about 4 litres; and the presence of one part of carbon monoxide to 200,000 parts of air by volume can be determined.

Another test for carbon monoxide in the atmosphere has been devised by H. Dejust, and described in the "Comptes Rendus" (Vol. CXL.). It is based upon the fact that when carbon monoxide is passed over silver oxide in the dry state at the ordinary temperature, the latter is reduced to metallic silver, with a very considerable rise of temperature—

$$CO + Ag_2O = Ag_2 + CO_2.$$

To be sure of the reaction starting, it is best to heat the silver oxide to 40 or 50° C., and it will proceed most rapidly if the gas is dry. In the presence of water there is a reducing action of the carbon monoxide on the oxide of silver; but it is very slow. The reduction of an ammoniacal solution of the silver oxide may be utilized for the detection of small quantities of carbon monoxide in air, by allowing it to drop from a funnel into a beaker at the rate of about 20 centimetres per hour; the same liquid being passed three times in succession. By comparing the colour of the reduced solution with standardized tints, an approximate measure of the proportion of carbon monoxide may be obtained; care being taken that no acetylene, sulphuretted hydrogen, or other reducing gas, is present.

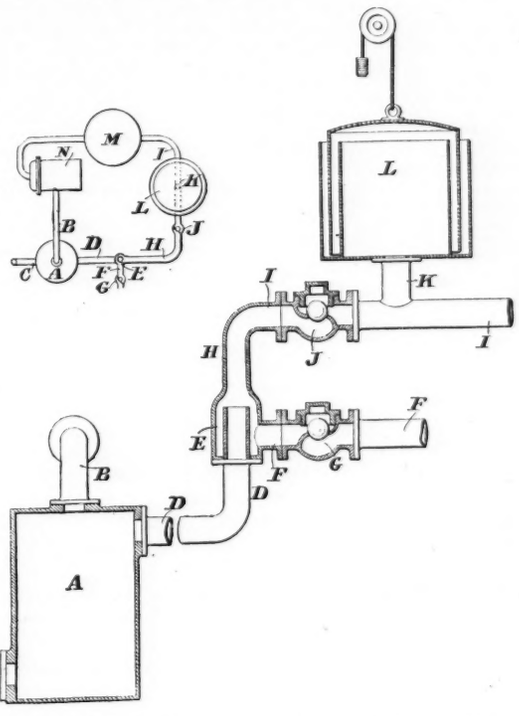
Recovery of Bye-Products from Gases.—M. Koppers has taken out a French patent for a simplified process for the recovery of bye-products, especially ammonia, from gases obtained by dry distillation, or by the gasification of combustibles. The crude gas obtained by distillation is cooled to the temperature most suitable for the separation of the tar, and the water separated at the same time is re-vaporized and re-introduced into the gas, which is afterwards heated, and treated in a bath of sulphuric acid, the strength of which is kept constant, and from which the salt that is separated is continually removed. The liquor remaining after the re-vaporizing process is treated in a column still, and the vapours pass direct to the acid bath. The apparatus designed for carrying out the process comprises, among other things, three coolers, of which the first serves also to heat the gas after the removal of the tar, and the second for the re-vaporizing of the water separated on cooling the crude gas—the necessary heat being derived from the crude gas itself. There is also an apparatus, provided with finely perforated sheet-iron plates, through which the gas passes in order to remove the tar in suspension.

REGISTER OF PATENTS.

Manufacture of Producer Gas.—Smith, H. E., of Hornsey Park Road, N. No. 16,069; July 20, 1904.

In producer-gas plants working above atmospheric pressure, the patentee proposes to utilize the exhaust from a gas-engine to inject saturated air into the chamber beneath the fire-bars of the generator, whereby the generator becomes partly regenerative, as the carbon dioxide in passing through the incandescent fuel takes up an extra atom of carbon, forming carbon monoxide gas. In suction producer-gas plant, he dispenses with the injector and allows the exhaust with the damp atmosphere to be drawn in by the piston of the engine. In this way, the required temperature in the generator of both suction and pressure plant may be maintained by varying the amount of the exhaust passing into the generator.

The accompanying illustration shows the method of arranging the plant for carrying the invention into effect.



A is a chamber or expansion box, and B a pipe leading from the exhaust of the gas-engine to the chamber A. C is an exhaust pipe to the atmosphere, and D an outlet pipe leading into an annular space or chamber E. This chamber communicates with a tube F, which is provided with a valve at G and also opens into the atmosphere. The chamber E is also connected by a tube H with the tube I; a valve being interposed at J. The tube I leads to the generator. K is a tube leading into the bell L, which is for the purpose of controlling the pressure of the flow of the mixture to the generator. The generator M communicates with the gas-engine N in the ordinary way.

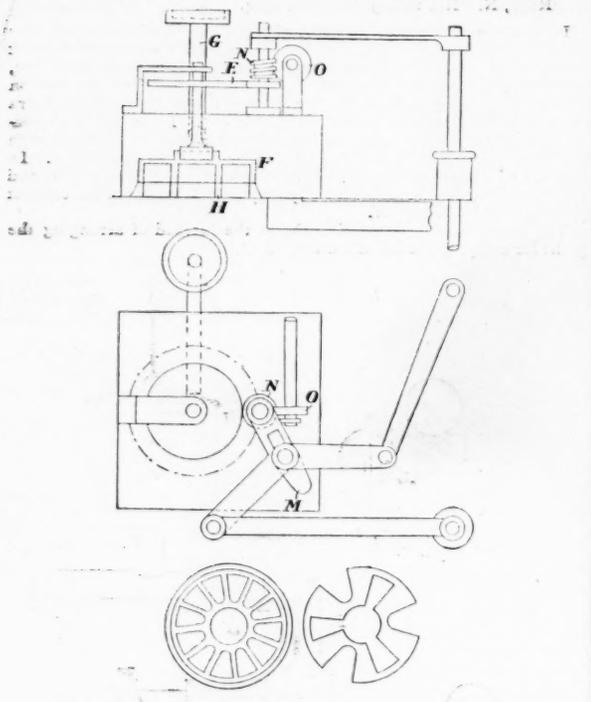
The generator is heated in the ordinary way and the engine started. The exhaust from the engine (mainly carbon dioxide and nitrogen) passes into the chamber A, where it is expanded. At the next exhaust, the exhaust gas, with a certain proportion of air drawn through the valve G, passes on along the tube D, through the valve J, and along the pipe I to the generator, where, coming in contact with the incandescent fuel, the carbon dioxide will be converted into carbon monoxide, and the oxygen combining with the carbon will also be converted into carbon monoxide. The carbon monoxide passes on to the gas-engine, where it is exploded with oxygen drawn in from the atmosphere; and as a result the engine expels from the exhaust carbon dioxide and nitrogen, as before, together with a certain quantity of impurities.

By working a producer-gas plant in this way, the steam at present passed into the generator for the purpose of cooling it and rendering clinkering practicable may be largely dispensed with, says the patentee, since the carbon dioxide from the exhaust of the engine takes its place in performing these functions, and, in fact, is more advantageous than steam, in that "the cleaning of the generator is greatly facilitated, and it is found in practice that a considerable percentage of the fuel in the generator is saved."

Valve Mechanism of Dry Gas-Meters.—Dickson, J. H., of Magherafelt. No. 17,055; Aug. 4, 1904.

To do away with, or prevent, the sticking of valves in dry gas-meters, the patentee suggests using a flat-faced valve F H (p. 566), working in connection with wheeled gearing, and one large toothed wheel E directly on top of the valve and connected to a spindle which passes through a stuffing-box, and has catches for the driving valve. There is a small toothed wheel or pinion which works with or into the wheel E, and having a worm N above a small wheel in contact with a segment or tangent M. A worm below the tangent works into a small toothed wheel O in connection with the index. The tangent revolves above,

and is connected to, two arms attached to "flag" wires, and driven by diaphragms inside the meter. It revolves three times to one revolution of the valve. To prevent the valve sticking, a tube G is put in direct communication with the valve inside the meter, so that it can be lubricated from the outside without removing any essential part.



The illustration shows the box, valve, and seating and gearing, with a plan of same, and plans of the revolving valve and valve seating.

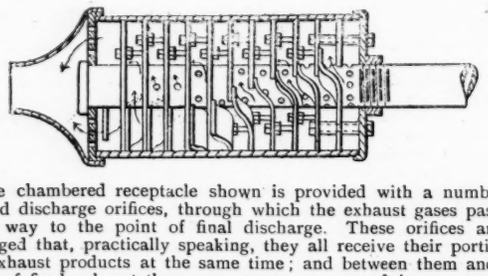
Effecting the Ignition of Combustible Gases in Gas-Engines.—Thwaite, A. H., of Great George Street, S.W., and Ward, M. W., of Bayswater, W. No. 20,046; Sept. 22, 1904.

This invention relates to a method of effecting the ignition of gases of low calorific value in the cylinders of internal combustion engines.

The method suggested is a pencil of refractory earth similar in constitution to that used by Nernst for illuminating purposes. It would be enclosed by a tube opening into the engine cylinder; the opening being controlled by a timing gear.

Muffling the Exhaust of Gas-Engines.—British Thomson-Houston Company, Limited; a communication from the General Electric Company of Schenectady, U.S.A. No. 20,551; Sept. 23, 1904.

The patentees claim to have discovered that the sound of the exhaust of gas-engines can be decreased to a point where it is unobjectionable—and this without the loss of any substantial amount of energy—by breaking up each sound-wave into parts, and delaying one or more parts behind the other or others; so that their deliveries to the point of final discharge will lag in time one with respect to the others. The invention thus depends upon the acoustic principle of interference between impulses; and the sound-wave for each exhaust discharge—instead of having a high and well-defined sharp peak—is flattened, and the discharge takes place with a low hissing sound.



The chambered receptacle shown is provided with a number of graded discharge orifices, through which the exhaust gases pass on their way to the point of final discharge. These orifices are so arranged that, practically speaking, they all receive their portion of the exhaust products at the same time; and between them and the point of final exhaust there are one or more conduits or passages. These are so arranged that they receive the exhaust from a number of different orifices, so arranged that the gas escaping from some of them has a longer path to travel than that escaping from the remaining orifices. In other words, one increment of gas or vapour due to a given impulse has to travel a certain distance in order to escape; another increment has to travel twice as far; a third has to travel three times as far; and so on. The orifices are preferably so arranged that either their area decreases toward the point of discharge, or, the area remaining the same, the number decreases. In either case there would be a gradual decrease in the effective area of discharge.

Tests show that there is virtually no back-pressure; the sound is reduced to a point where it is unobjectionable; and the muffler, as a whole, is "smaller than those customarily employed for the same size and type of engine."

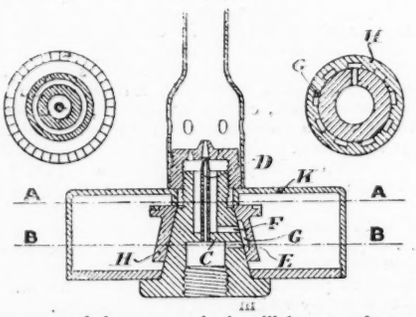
Timing Devices for Turning on and off Gas, &c.—Horstmann, A., S. A., G. O. H., & E. H., and Edgar, E. H., of Bath. No. 27,849; Oct. 20, 1904.

This invention relates to time switches, driven by clockwork mechanism, for the periodical turning on and off of gas, &c., and provide means whereby the switch shall be rendered variable, either according to the lighting-up and extinguishing table in general use, or according to any special time chart.

The inventors provide one or more variable points, pins, cams, or levers in the circumference of a wheel or disc, which is made to rotate from a central shaft at a fixed rate of speed; the object of the pins or levers being to switch on or off the gas, either directly or indirectly. They are made to vary their circumferential position from time to time by mechanical means, and are actuated by cams, or the varying radii of wheels, so as to give a regular or irregular amount of variation during recurring periods of time.

Improvements in or relating to Gas-Cocks.—Glühlicht Gesellschaft "Union" Gesellschaft mit Beschränkter Haftung, of Cologne. No. 963; Jan. 17, 1905. Date claimed under International Convention, Oct. 24, 1904.

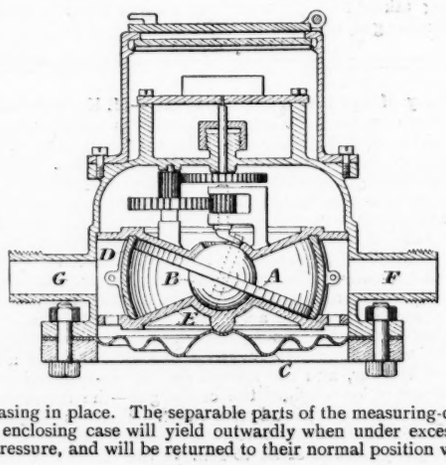
This gas-cock is of the class which comprises a fixed spigot forming the gas-nozzle, and a casing rotatable about the spigot and forming the cut-off device; the casing being connected with a ratchet wheel or the like adapted to be operated from a distance by an electro-magnetic device. The invention consists primarily in providing the usual interior recesses in the cock casing entirely around the circumference, so that the gas may be alternately admitted to the spigot and cut off from it by the rotation of the casing, as illustrated in vertical section and cross sections on the lines A A and B B respectively.



The upper part of the gas-nozzle, it will be seen, forms a conical spigot; the gas-conduit therein being divided by a horizontal wall C, provided with a small hole from which a bye-pass D extends vertically upwards, and above and below the wall are two lateral orifices E F. The spigot is surrounded by a sleeve or casing H provided with the internal recesses G extending at frequent intervals around its entire circumference; so that during the rotation of the casing the ducts E and F are alternately closed by the wall of the casing, and placed in communication with each other by means of the recesses. The rotation of the casing may be effected in any known manner—by an electro-magnetic device provided with a pawl or the like adapted to engage the toothed rim of the casing, or by lever mechanism directly operating it. The electro-magnetic operating device (not shown) is surrounded by a suitable case or box K.

Water-Meters.—Gumz, A. E., and Wingender, A. W., of Milwaukee, U.S.A. No. 4201; Feb. 28, 1905.

This invention in water-meters pertains more especially to the construction of a resilient support or spring for holding the separable parts



of the casing in place. The separable parts of the measuring-chamber and its enclosing case will yield outwardly when under excessive internal pressure, and will be returned to their normal position when the

pressure is removed. In this way, "the liability of the castings, forming such parts, becoming broken by frost or by excessive internal pressure from any cause is avoided."

The application of the invention is shown in connection with a disc meter. A is the measuring disc provided with a central spherical shaped bearing B centrally supported within the measuring-chamber. This chamber is formed of separable parts (comprising the upper head, lower head, and the intermediate annular wall), yieldingly retained together and held in place by the resilient action of the diaphragm C. The measuring-chamber is enclosed on all sides except the bottom, by the housing or exterior case, while the bottom is closed by the expansible diaphragm.

The meter case is provided with contact bearings against which the upper head of the measuring-chamber rests. This upper head being first put in place, the intermediate annular wall D, the measuring disc A, and the lower head E are inserted in the order shown, when they are held in place by the resilient action of the diaphragm, which is secured to the annular walls of the exterior case by bolts. The centre of the diaphragm is preferably curved upwardly as shown, so as to bear against the opposing central projection of the lower head, whereby, when the diaphragm is bolted to the exterior case, all of the separable parts are secured together.

It will be understood that water is led into the exterior case between the upper and lower heads through the duct F; thence it passes through the measuring-chamber and actuates the measuring disc in the ordinary manner, and escapes through the duct G.

Regenerators for Retort-Furnaces.—Hermansen, A., of Bromolla, Sweden. No. 9948; May 11, 1905.

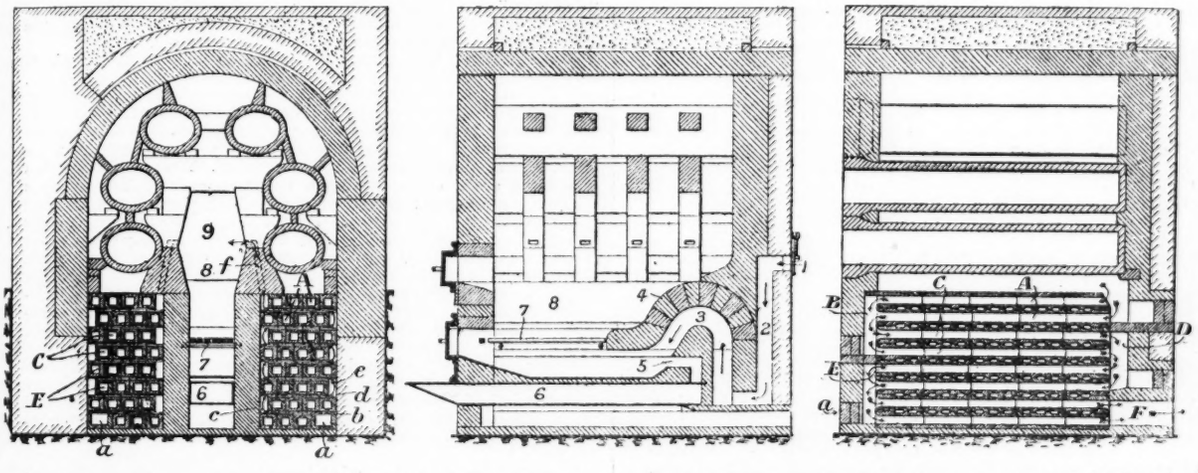
The patentee's claim is: "In a regenerator having two flue systems, both shaped as wide undulating bands, so interlatticed that any horizontal stretch of either one is interposed between two horizontal stretches of the other one, building up the regenerator of standard blocks, each perforated by a channel, and provided at the top and bottom with grooves at right angles to the channel; such blocks being arranged side by side and end to end in tiers or courses, so as to produce two independent flue systems, transverse to each other—the one being formed by the interior channels of the blocks, and the other by the top and bottom grooves of the blocks."

The regenerator is built, as shown, by using standard blocks of the form indicated. A course of several such blocks is laid so as to form several adjacent ducts lengthwise of the furnace, and serve as flues for the combustion gases. Another course is laid on top of the first one, and the transverse channels in its lower surface, in combination with those in the upper surface of the first course, form flues for the secondary air. Other courses are laid in similar manner; and by breaking joint in the consecutive courses—off-setting them, for instance, half-a-block crosswise of the furnace—intermediate spaces are left, alternately on one side and the other, each serving to connect two consecutive flues for the secondary air. Intermediate spaces are also left for connecting the combustion-gas flues as desired, as, for instance, by making recesses in the end walls of the furnace.

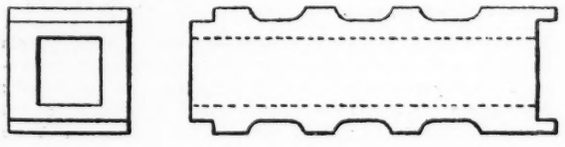
In the illustrations, the path of the primary air is indicated by featherless arrows, that of the combustion gases by feathered arrows, and that of the secondary air by arrows terminating in a small circle.

The primary air is introduced at the rearside of the furnace at 1; passes thence through the flue 2; thence up through flue 3; under the fire-bridge 4; and finally, after having passed the outlet 5, from the evaporation box 6, goes through the grate 7 to the gas-producer 8.

The secondary air is introduced in front, near the bottom, into a flue *a*, running lengthwise through the entire furnace; and from this flue the air is carried through horizontal transverse flues *b* towards an inner chamber *c*, extending lengthwise through the entire furnace. Here the air ascends and passes into the transverse flues *d*, situated at a higher level; and from these it enters an outer chamber *e*, and



continues its route so as to alternately pass towards the centre of the furnace, and thence, at a higher level, towards the sides, until, finally, through the flues *f*, it is led into the combustion chamber 9, where it meets the producer gas.



The combustion gases pass up along the retorts on the side nearest to the centre of the oven, and then downwards along their outer sides; thence, from the rear part of the furnace, through horizontal longitudinal flues A, to a chamber B, running along the front of the furnace. Here the smoke descends, and enters the front end of longitudinal flues C, situated at a lower level than the flues A, and conveying the smoke to a chamber D, at the back of the furnace, where the smoke descends again and enters longitudinal flues E, and finally, through a channel F, to the chimney.

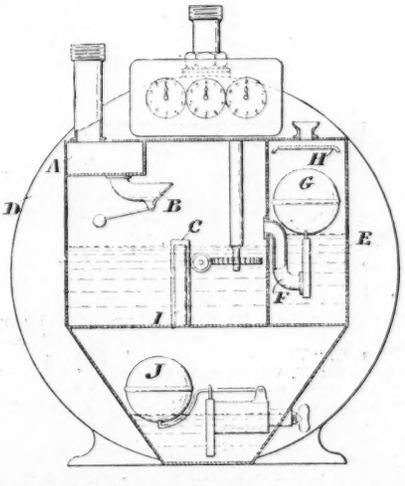
Gas-Meters.—Caffaro, G., and Bracco, J. V., of Buenos Ayres, Argentine Republic. No. 7040; April 3, 1905.

This invention relates to means for ensuring "constant exact working" of gas-meters and to prevent them being tampered with.

The gas enters from the main into the compartment A, and thence through the counterbalanced flap-valve B into the measuring chamber; and here it enters the tube C and passes through the compartment D upwards to the outlet. The measuring appliances and their arrangement are of the common type, and need not be described.

E is the compartment for filling in the water through the inlet above. At a certain height, a curved tube or syphon F is connected with its upper end to the partition wall, and at its lower end a rectangular vertical casing is secured. Within this casing is a slide, which normally closes the port of the casing. To the upper end of the slide, a float G is fixed, which, when the water in the compartment passes a certain height, causes the slide to ascend. Beneath the water inlet opening a plate H is fixed, so as to protect the float from being pushed down or otherwise disturbed.

When the level of the water in the main compartment has reached a certain height, all additional water entering will flow out through the upper end of the tube I, leading through the bottom of the main compartment into the lower compartment, where it remains until it also passes a predetermined level, whereupon the float J will ascend and



lift a slide provided in the casing so that its opening corresponds with those of the casing; and thus the water will be allowed to flow out through a tube and spout. A vertical transversal partition is provided in the water outlet tube, so as to protect the slide valve being operated in any improper manner, by means of a tool or the like.

The valve provided at the outlet of the meter is of such construction that it will only allow of the passing of the gas current in one direction

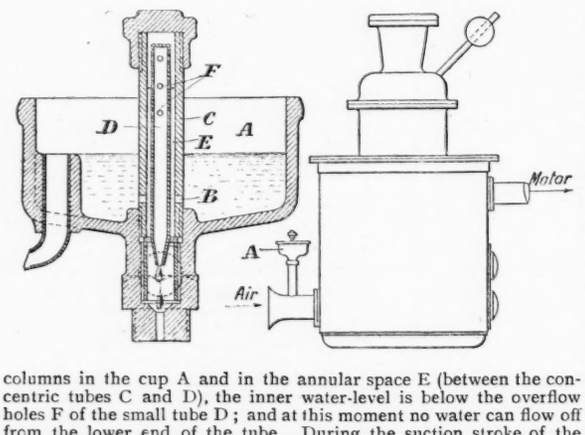
—that is to say, from the meter to the service-pipes. A current going in the opposite direction—as might, for instance, be produced by blowing into the pipe above the valve casing for the purpose of causing the indicators to move backwards—will not pass.

The gas cannot at any time pass from the main compartment to the chamber E, since, when there is little water in this latter, the float G and slide keep the communication shut by their own weight; and as long as the high-water level keeps the float with its slide afloat, the water flowing during that time from the compartment E to the main chamber does not allow of any gas passing in the opposite direction. It is quite impossible to withdraw any water through the compartment E, since, although all the water contained in it were pumped out by a rubber tube, the communication. which is in that case kept perfectly closed by the slide and float G, will not admit of any water being drawn by suction from the main compartment into the compartment E.

Automatic Water-Feed Device for Gas-Generating Apparatus.—Bauer, C., a communication from the Güldner Motoren Gesellschaft mit Beschränkter Haftung, of Munich. No. 7241; April 5, 1905.

In order to render in suction gas generators the amount of steam participating in the gasifying process dependent upon the load of the motor, and in order to obtain a suitable composition of the gas, the feed water is introduced at each charging stroke into the air sucked in by means of an apparatus actuated by the suction action of the motor.

A side elevation of a generator-gas plant, and a vertical axial section of the water-feeding apparatus, are shown. The water-feed apparatus is composed of the water-cup A, which is in constant communication by holes B with the rising pipe C. In the latter is a small overflow pipe D, the lower end of which is tightly mounted in the base of the water-cup and leads through this base and into the air-duct of the generator. As long as equilibrium is maintained between the water-



columns in the cup A and in the annular space E (between the concentric tubes C and D), the inner water-level is below the overflow holes F of the small tube D; and at this moment no water can flow off from the lower end of the tube. During the suction stroke of the motor, a temporary depression is produced in the air-supply duct of the generator, into which the water-feeding apparatus opens, as shown. The depression naturally continues into the annular space E and there causes the water-level to rise above the overflow holes F. At this moment, consequently, a corresponding amount of water flows through the tube D into the air passing below into the generator. This water is afterwards decomposed in the generator after having been transformed into steam. As soon as the suction action of the motor ceases, the water level falls again in the annular space E below the escape holes, and the feeding of water into the generator is stopped until the next suction stroke.

The apparatus thus feeds only when the motor sucks, and the quantity of water fed to the generator always corresponds to the amount of air sucked in, and consequently to the height of the depression in the annular space.

APPLICATIONS FOR LETTERS PATENT.

16,473.—Welch, G., "Gas-burners." Aug. 14.
16,477.—Sugg, W. T., "Apparatus for compressing gases." Aug. 14.
16,491.—Harrison, S. Q. & C., "Coiling apparatus for hollow or solid flexible conductors for gas, electricity, and the like, with auxiliary support for the hollow conductors. Aug. 14.
16,531.—Bradbury, E., "Pipe joints." Aug. 15.
16,557.—Camp, H., and Ryan, E., "Gas-Cookers." Aug. 15.
16,562.—Glover, T., "High-pressure gas lighting relief and pressure valve boxes." Aug. 15.
16,571.—Entwistle and Stephens, Ltd., and Dane, H. E., "Attachment device for shades of inverted gas fittings." Aug. 15.
16,579.—Bueb, J., "Vertical retort-ovens." Aug. 15.
16,600.—Hutchins, T. W. S., "Gas-producers." Aug. 16.
16,603.—Maddock, S., "Water-storage cisterns." Aug. 16.
16,620.—Rieusset, J. A., "Gas-tap for inverted incandescent or other suspended lights." Aug. 16.
16,659.—Sutcliffe, C. J. F. & J. W., "Incandescent mantles and burners." Aug. 16.
16,678.—Dunlop, J., and Stewart, D., and Co. (1902), Ltd., "Gas-producing plant." Aug. 17.
16,712.—Matton, A., "Globe-support and mantle-rest." Aug. 17.
16,757.—Kettler, E., "Machines for preparing gas-mantles." Aug. 18.
16,789.—Willey and Co., Ltd., and Surman, J. L., "Gas-pendant joints." Aug. 18.
16,816.—Ashworth, H., "Gas-fires." Aug. 19.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Cause of "Blue" Sulphate of Ammonia.

Sir,—I read with interest the lucid paper presented at the meeting of the Irish Association, by Mr. C. B. Outon, in the current issue of the "Journal," on "A Modern Sulphate Plant." I do not, however, agree with his explanation as to the cause of "blue" sulphate of ammonia. [By the way, the second equation on p. 499 should be $2NH_4CN + H_2SO_4$, &c.] In the first place, ammonium cyanide can hardly exist as such in a saturator while at work, but would be dissociated into ammonia and hydrocyanic acid; and it is very improbable that this acid would be absorbed in an alkaline solution such as would be produced even in other than normal working conditions.

My opinion is that "blue" salts are mostly produced by the "priming" over of raw gas liquor from the stills. I have repeatedly found coloured salt forming in very acid solutions. It is interesting to read the very many explanations given from time to time in the "Journal" as to the cause of the phenomenon; and the articles in Vol. LXXVIII., p. 394, and Vol. LXXXIX., p. 360, are very instructive. I do not believe that coloured salts can be formed otherwise than by "priming;" but I cannot think that an alkaline saturator means absorption of hydrocyanic acid.

Wilfrid Wyld.

Bradford Chemical Works, Frizinghall, Aug. 23, 1905.

Retention of Power Supply by Gas Undertakings.

Sir,—I have read with much interest the leading article in the "Journal" for the 22nd inst. on the above subject. The issue in question is set forth very clearly and to the point; and I quite agree with you that it is no use blinking facts that exist to-day.

We had at Long Eaton, I believe, the second and third suction plants in England, and they have been working now practically two years. During that time I have had many opportunities of noting the working, and am fully aware of the many advantageous points they have, and also, of course, all their disadvantages, which I am bound to say are not so many as is generally imagined. Last year we decided upon a reduced scale of prices, as per the enclosed list. You will notice it is a graduating scale, depending upon the consumption. The accounts are rendered monthly; a discount being allowed providing the amount is paid within the next month. The reason the whole of the power prices were not put down to 1s. 6d. was because, in my opinion, for small gas-engines—say, up to 20-horse power—which are used during the day only, town gas of an average value of 600 B.T.U. is by far the cheapest sort of power. But when you get over 50-horse power it involves the attention of an engineer of some sort; and the scale is completely turned, as the manufacturers neglect to include labour in their cost.

A new point which has had to be faced in connection with these suction plants has been that of stand-by or emergency charges when town gas is laid on simply for emergency purposes when the suction plants are broken down, or during cleaning, &c. In these cases, I have charged full lighting prices; and you will understand the reason for this.

I may say that for a plant of 50-horse power and upwards it is exceedingly difficult to sell gas at even 1s. 6d. per 1000 cubic feet; and from what I have seen during the past few years, and the trend of current events, I should say that town gas will very soon have to be sold at 1s. per 1000 cubic feet if it is to compete with suction-gas plants as they are now being turned out.

G. Stevenson.

Long Eaton, Aug. 26, 1905.

[The following is the scale of charges per 1000 cubic feet for gas employed for continuous power purposes referred to by our correspondent: A monthly consumption of less than 40,000 cubic feet, 2s. 1d.; between 40,000 and 80,000 cubic feet, 1s. 10d.; between 80,000 and 130,000 cubic feet, 1s. 8d.; above 130,000 cubic feet, 1s. 6d. These prices are net for cash monthly.—Ed. J.G.L.]

Price of Gas for Power Purposes at Stafford.

Sir,—I notice in the leading article on the "Retention of Power Supply by Gas Undertakings" in the current issue of the "Journal" that Stafford's price for gas for power purposes is put down at 2s. per 1000 cubic feet. Please permit me to correct this. Our price is 2s. subject to certain discounts, which the power user always takes advantage of. The scale is as follows: Where the quarterly consumption is under 50,000 cubic feet, 2s. per 1000, less 2½ per cent.; where it is 50,000 and under 100,000 cubic feet, 2s. per 1000, less 10 per cent.; where it is 100,000 and under 200,000 cubic feet, 2s. per 1000, less 20 per cent.; and where it is 200,000 cubic feet and upwards, 2s. per 1000, less 25 per cent. The scale is applicable not only for power, but also for heating and for manufacturing purposes. The net price works out, therefore, at 1s. 11·4d., 1s. 9·6d., 1s. 7·2d., and 1s. 6d., according to the quantity taken.

Hubert Pooley.

Stafford, Aug. 25, 1905.

The Junior Gas Associations.

Sir,—Permit me, as a late member of the Manchester and District Junior Gas Association from its formation, and a member of Council from 1901 until my present appointment in Ceylon some eighteen months ago, to thank you for your "Editorial Note" on "Life Among the Juniors," see "Journal" for July 18. It must be a source

of gratification to every Junior Association to feel that their efforts are realized and appreciated by senior members of the profession; and your remarks as regards the particular Association to which I had the honour to belong are no more than just.

As pioneers, we bore the brunt of the fight; and I think that, without boasting, we may say that it was owing to our success that we now see similar Institutions springing up all over the country. The individual good that these Junior Associations do can only be realized by becoming a member; and my advice to all the younger men in the profession is to join one or other of these Associations. Long may they thrive to carry on their good work. I raise my glass to them all, but especially to the one with which I was so pleasantly and intimately connected, and which, "though lost to sight, remains to memory ever dear."

Colombo, Ceylon, Aug. 9, 1905. L. GRESHAM BARBER.

LEGAL INTELLIGENCE.

Robberies by a Gas Inspector.

At the Westminster Police Court last Wednesday, Ernest Alfred Ramsden was charged on remand, before Mr. Francis, with stealing jewellery and other property from houses to which he had gained access as an examiner of gas-fittings and incandescent mantle cleaner. The facts were reported in the "JOURNAL" last week (p. 508). Mr. Humphreys, who appeared for the Gaslight and Coke Company, said the prisoner entered their service with a good character in the very subordinate capacity of assistant to a mantle cleaner. He left without notice; and, from what came to the knowledge of the Company, information was given which led to his arrest. Detective-sergeant Cornelius said a large number of pawn tickets were found on the prisoner, and some of them related to property not identified. The prisoner pleaded guilty to more than one charge. His Worship remarked that the offence committed was one of a very dangerous class; and he sentenced the prisoner to nine months' hard labour.

Liability for Damage to a Gas-Main.

At the Axminster County Court last Wednesday, before his Honour Judge Beresford, an action was brought by the Lyme Regis Gas Company against the Lyme Regis Corporation, in which £5 was claimed for loss of gas caused by the fracture of a gas-main. Mr. A. J. Mawer, who appeared for the Company, stated that plaintiffs had for many years supplied gas for both public and private lighting; the Corporation allowing them to lay mains along the streets. On the 14th of March an escape of gas was discovered, and on the ground being opened it was found that the main had been fractured. The Corporation had been laying a new water-main parallel to the gas-main; and owing to the negligent manner in which the trench had been filled in, the gas-main was left unsupported, and gas to the value of £4 10s. at least was wasted. Evidence was given in support of the claim, which showed that the gas-main was left unsupported for a length of 12 to 14 feet, and that the water-pipe was only 9 or 10 inches from the gas-pipe. Mr. Walter Harvey, the Secretary to the Gas Company, said that a claim was made upon the Corporation, who repudiated liability. The main had been laid 19 years, and would last 15 or 20 years longer. Mr. Preston, for the defence, contended that the leakage of gas was due to the rotten condition of the mains, and to their being laid at a depth of only 10 or 12 inches. Several witnesses gave evidence as to the laying of the new water-mains. Mr. Eli Sprackling, the Borough Surveyor, said he passed the work of the Contractors (Messrs. Langford and Rendall) as a whole. When this particular place was opened there was certainly a hollow. When the claim was made by the Gas Company, the cheque due to the Contractors for the water-works was kept back for some time. His Honour said the claim was practically undefended. The Gas Company wrote a very proper letter to the Corporation claiming £5, and saying that they did not want to be too hard on the Contractors; and the reply of the Corporation was most improper. He was only sorry that the Company did not claim £50. There was no doubt that the main was damaged because it had been undermined and the wet weather caused the fracture. The Contractors (who had been joined as co-defendants) ought not to have been brought there; and the case against them would be dismissed. There would be judgment against the Corporation, with costs.

Restricted Water Supply in Liverpool.—For some weeks past the supply of water from the Rivington reservoirs of the Liverpool Corporation has diminished to a serious extent; and Alderman W. J. Burgess, the Chairman of the Water Committee, has on more than one occasion made an earnest appeal to householders and others to be as careful as possible in the use of the water. Now the position is such as to demand more drastic action on the part of the Committee. A special meeting of the members was held last Tuesday, and the result was an announcement that the supply of water would be turned off between 7 p.m and 6 a.m. daily from the 23rd to the 30th inst. From the latest published returns of the Water Engineer (Mr. J. Parry, M.Inst.C.E.) it seems that the volume of water from Rivington has greatly diminished as compared with the corresponding period of last year. For the week ending the 5th inst., the quantity from Rivington alone distributed within the limits of compulsory supply (Liverpool and the out-townships) was 66,164,000 gallons, and for the week ending the 12th inst., 60,937,000 gallons. These figures compared with 75,113,000 gallons and 75,668,000 gallons in the corresponding weeks of last year. Meanwhile the yield from the wells has slightly increased; while Vyrnwy during the fortnight referred to sent to the city 177 million gallons, or about 3 millions more than in 1904.

MISCELLANEOUS NEWS.

CROYDON GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Friday, at the Croydon Art Gallery—Mr. CHARLES HUSSEY, J.P., in the chair.

The SECRETARY (Mr. W. W. Topley) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

THE WORKING RESULTS.

The CHAIRMAN, in moving their adoption, said it would be seen from the accounts that one of the most striking features in regard to the half year was that, notwithstanding that they had an increase in the sale of gas, there was a marked drop in receipts as compared with a year ago. The increase in the sale of gas was not, it was true, a great one—being 2·35 per cent. only; but having regard to the mildness of the winter, and comparing the results with those of other gas companies for the same period, the Directors saw no reason to be dissatisfied with it. Further, in comparing the receipts with those of last year, it should be borne in mind that the price in the Carshalton district was 3d. per 1000 cubic feet lower than a year ago; that to develop the use of gas a discount of 3d. per 1000 cubic feet was now given on gas used for motive power; and that the discounts given to large consumers had been revised, and were on a somewhat more liberal scale. The result of these three concessions to consumers was that the receipts from the sale of gas were less by rather more than £1000 than they would otherwise have been. The receipts from the sale of coke were, of course, very disappointing. The acute depression in the coke market was one which had affected, and was affecting, gas companies adversely, and in a way which to a large extent was beyond the control of those directing the industry. Had not the Company adopted some years ago the manufacture of carburetted water gas, thus using a large quantity of coke, the Board feared the result would have been still worse. He was sorry that, so far, there did not seem to be any prospect of an early improvement in this direction. If coke were used to a greater extent for domestic purposes, much would be done towards the adjustment of demand to supply. Shareholders in gas companies would do well to try for themselves the economy effected by a judicious use of coke in admixture with coal, and induce others to do so too. The net result of the half-year's operations was a profit less by £1584 than the amount required for payment of the half-year's dividends. But there was a large carry-over from December; and the very respectable balance of nearly £4000 would remain this half year, after providing for dividends, to be carried forward. The growth in the number of the consumers showed no signs of abatement. They had added in the half year 1104 accounts—367 on the ordinary system and 737 on the prepayment; and the number of cooking-stoves on hire had been increased by 1235. The continued efforts made to popularize the use of gas for cooking would be seen to have borne fruit, when he told the proprietors that while in 1895 only 25 per cent. of the consumers hired cookers at rent, now some 50 per cent. paid rent for their stoves—thus showing an increase of 100 per cent. in ten years. The amount of work the Company did in connection with the hiring-out of stoves would be appreciated when he stated that, during the last twelve months, they had sent out from store 6080 stoves, and had brought in 3882—a total of no less than 9962 stoves dealt with. He might mention here that, to enable the cleaning and repairing of stoves to be done under better conditions than had been possible of late years in the cramped space available at Katharine Street, the Directors were now constructing at considerable expense new stove cleaning and repairing shops at the works at Waddon; and these would be fully equipped with the most modern appliances, which would enable the Company to carry out the work more quickly, efficiently, and economically. It might seem at first sight strange that, with a continuous large increase in the number of consumers, there should not be a corresponding increase in the quantity of gas sold. This was partly due to the fact that the proportion of prepayment accounts to the total number had been for some years past a steadily increasing one. But this would not seem to be all. It was a somewhat striking fact that, in the past five years, the average quantity of gas annually used by the prepayment consumers in the Croydon district had fallen to the extent of some 10 per cent.—viz., from 19,946 cubic feet to 18,070 cubic feet. The expenses of business done under these changed conditions were greater; but as the basis of operations was broadened, the stability of the undertaking was increased. Prepayment consumers did not (at all events to any appreciable extent) use gas in heating-stoves. Therefore, their accounts were less subject to fluctuation through climatic causes than those of residents in larger houses; and, further, consumers of this class when they got gas installed in their houses did not to any extent use other means of illumination. Some reason for the decrease in their rate of consumption must, however, exist. Partly it might be due to pressure of hard times, and the necessity for small domestic economies. But it was difficult to resist the conclusion that gas was being used now by more efficient appliances than in the past, and that the same, or better, results were being obtained by consumers with a lessened consumption.

CAPITAL EXPENDITURE.

The proprietors would see that a good deal of money was being spent on capital account. In view of this, and of the expenditure which was still going on, the Directors had found it necessary to raise a considerable amount of additional capital in the half year. The expenditure on plant in the six months had been entirely on the new retort-house. This was nearing completion; and the Engineer hoped to have it in work before the coming winter. The Company would then be making their coal gas under much more favourable conditions than last year; and the Board confidently hoped to effect some considerable saving in this

direction. They had also spent a large sum on mains; and the accounts in capital for meters, stoves, and fittings grew with the increase in the number of consumers hiring them.

AMALGAMATION WITH THE CATERHAM COMPANY.

It would have been seen from the report that the amalgamation with the Caterham Company, the Bill for effecting which was approved in February last, was now an accomplished fact. Petitions against the Bill were lodged by two Local Authorities; but the Company were fortunately able to meet their views to an extent sufficient to avoid the expense of a contest in Committee. The Croydon Corporation pressed for the insertion of a clause limiting the Company's powers of giving special terms; and a modified form of the clause they suggested had been inserted. It did not affect any allowance the Directors had made, or any that, so far as they could see, they would be likely to make in the future. It was not a little curious that the Electric Lighting Committee of the Corporation should seek to limit the Gas Company as to differential prices within the bounds of 20 per cent. on the grounds of fair competition, while their own rates of charge to different consumers for electric current showed variations up to as much as 60 or 70 per cent. The Company had been, since the 1st of July, in possession of the undertaking of the Caterham Company, and were at present continuing the manufacture of gas at the Caterham works. They would go on doing this during the coming winter, as the proposed extension of the Waddon works—notably the new scrubbing, washing, and purifying plant—would not be ready to be brought into use till next year. A high-pressure main was now, however, being laid from their district as far as the Caterham works at Whyteleafe; and they would shortly be in a position to utilize either source of gas supply as might from time to time prove expedient. As was stated in the report, the proprietors of the Caterham shares and debenture stock received amounts of the Company's stocks representing their former holdings. The holders of the £25,000 fully-paid ordinary shares, with a maximum dividend of 10 per cent., received an equal amount of new stock, created for this purpose, and termed "E" stock, ranking for dividend up to 10 per cent. with the Croydon "B" stock. The holders of the 5 per cent. preference shares received "D" stock to an amount equal to that of their holdings; and the 4 per cent. debenture stockholders became holders of a like stock of this Company. The conversion of capital was thus effected without any change of nominal amount. It would be noticed that no recommendation was made in the report as to payment of dividend on the "Caterham" capital for last half year; the reason being that the Act provided for the payment of dividends out of that Company's profit for last half year. When this had been done, there would be left an undivided balance of the profit made by that Company amounting to £1087. It was agreed with the Caterham Company that one of their Directors, to be selected by their Board, should become a Director of the amalgamated Company. Mr. Hall, the Chairman of the Company, had accordingly joined the Board, and was with them that day. The Directors had pleasure in welcoming him as a colleague, whose long residence in the district, and intimate knowledge of it, as well as of the affairs of the Caterham Company, would make his advice and assistance of great value to them in the added responsibilities they had undertaken. In the financial estimates which were laid before the Board by their officers before they agreed to the amalgamation, regard was had to the fact that, while the fees of the Caterham directorate would be saved, an additional Director at Croydon would have to be provided for, and the proprietors would have seen from the report that they would be asked to pass a resolution authorizing the necessary increase in the total of the Directors' fees for so long as the Board consisted of eight members. On the first vacancy occurring, other than by rotation, the number of the Directors would again become seven.

AGENCY ARRANGEMENTS WITH LOCAL TRADESMEN.

During the half year a step has been taken in the direction of agency arrangements with local tradesmen. As an outcome of the Gas Exhibition at Earl's Court last December, the suggestion was made that steps should be taken to bridge over the gulf which had for years past been gradually widening between gas companies and tradesmen dealing in appliances for the use of gas. The increasing business done by gas companies in hiring-out cookers and gas-fires, and in supplying other appliances on terms very favourable to consumers, while it had undoubtedly created a demand which would not otherwise have existed, had also introduced a form of competition which could not be met by tradesmen, whose only interest lay in the immediate profit they could make. The same process had been going on in regard to the supply of incandescent burners and mantles, and the arrangements for maintenance of incandescent burners. The result had been that ironmongers and gas-fitters had, to a certain extent, ceased to push the supply of gas appliances. That this should be so was not, the Directors believed, to the interest either of the tradesmen, or of the gas undertaking; and it had been decided that an attempt should be made by the Company to render it worth the traders' while to give more prominence to gas appliances in their shops, and to encourage the various uses of gas among their customers. To this end, an informal conference had been held between the Company's officers, and representatives of the local ironmongers and gas-fitters. Terms of agency arrangements had been worked out, and approved by the Directors; and they hoped shortly to have in each of the chief local ironmongers and gas-fitting firms in the district active agents for the more extended use of gas.

THE STREET LIGHTING QUESTION.

Those of the proprietors who resided in Croydon would doubtless have noticed that the question of the cost of street lighting had recently been engaging the attention of the Croydon Town Council. Early in the year, a resolution was carried by the Council requiring the Committee who had control both of the street lighting and of the electricity undertaking to inquire into the cost of public lighting, and to make such suggestions to the Council as would lead to a considerable reduction. It would naturally be thought that, before presenting a report on such an important subject, a Committee charged with the responsibility of street lighting would have ascertained what could be done by means of the various systems available, and that offers from the two Gas Companies supplying gas in the borough would have been obtained for the purposes of comparison. No such course, however, was taken; and a report, dealing mainly with entirely illusory figures as to nominal candle power, and giving but little information on the question of efficient and economical lighting, was presented. Notice had been given in the Council of a motion requiring that offers from the Gas Companies be obtained, and submitted to the Council for their consideration; and if the motion were carried, the Company intended to present a report with a full statement as to the cost of lighting the borough. That the increase in the cost of public lighting was not a small matter from the ratepayers' point of view, was seen from the fact that, since the introduction of electric street lighting in Croydon, the lighting rate of the borough had increased by one-third, or from 3d. to 4d. in the pound. The Company were, as one of the largest ratepayers in the borough, concerned in anything that related to the economical management of its finances. The Directors thought that the Company paying, as it did, local rates in Croydon to the extent of over £6600 per annum had a right to urge that ordinary business considerations should weigh with the Town Council in their deliberations upon this matter. It was probably not known to the ratepayers generally that while the present annual cost to the Corporation for lighting in the streets lit by gas was some £55 per mile, the sum annually charged in respect of the streets lighted by electric arc lamps amounted to just under £500 per mile. The Directors were satisfied that, if the main streets now lighted by electricity were lit throughout by modern and improved gas-burners, the town would be fully as efficiently, or better, lighted; and a saving would be effected equal to about a penny rate, or £3738 per annum.

MR. HELPS AND THE BIRMINGHAM MEDAL.

He was sure the proprietors would have pleasure in joining with the Directors in congratulating their Engineer and General Manager on the distinguished honour conferred upon him by the Council of the national gas organization of this country—the Institution of Gas Engineers—in awarding to him the Birmingham Gold Medal. The medal was the greatest honour the gas industry had to confer; and it had been given only eight times since it was first awarded in 1882—the last occasion being in 1897, when it was presented to Baron von Welsbach, the inventor of the incandescent mantle. It was a source of very great gratification to the Directors that the public work of their Engineer had received such fitting recognition.

The DEPUTY-CHAIRMAN (Mr. Thomas Rigby) seconded the motion.

Mr. DALZIEL said he understood the Directors had borrowed £25,000 on debentures; and he would like information as to how it had been spent, and whether it was productive or non-productive. Also whether, in building the new retort-house, the contract was let by tender or otherwise.

The CHAIRMAN replied that they raised during the half year £25,000, and since then £15,000 more. He should think that no body of proprietors would imagine Directors would spend capital without they expected to get a return from it. The building of the new retort-house was contracted for by tender; and it was a local builder who got it. They had spent on plant in the new retort-house £9992; on mains and service-pipes (consisting of 13,780 yards and 1405 services), £6072; 1097 additional meters cost £1747; and 1085 additional gas-stoves cost £3096. Then, of course, sums were required in connection with the Caterham undertaking. Paying off the Company's loans and the parliamentary expenses represented £20,000. The proprietors would remember that, in August last, they had sanctioned the raising of £72,500, as required, by the issue of debenture stock.

Mr. DYER congratulated the Directors upon the acquisition of the Caterham Company, in view of the good he thought it would do to the whole of the neighbourhood around. If they were going to develop the district, it would want more than £25,000 or £55,000 of capital. They were taking over a splendid district, which he hoped would necessitate a large outlay of capital for many years to come. He was confident that what had been done would not only benefit Caterham, but would be the means of reducing the price of gas in Croydon. The South Metropolitan Gas Company took over the Phœnix and Woolwich Companies; and there they had gas now at 2s. per 1000 cubic feet. The capital of the South Metropolitan Company was low in proportion to the business done; and so would be that of the Croydon Company. It was now a little over £5 per ton of coal carbonized; while he believed the South Metropolitan Company was something like £4. When Croydon got down to £4 per ton, they would be able to sell gas cheaper.

The CHAIRMAN said he should like to add some further figures to his previous statement. In the last ten years, the number of meters had risen from 9134 to 24,596; stoves, from 2837 to 13,353; and fittings, from 5372 to 48,270. Notwithstanding the operation of these causes, the capital account relative to the business done, expressed in terms of 1000 cubic feet sold per annum, had in the period of ten years decreased from 11s. 6d. to 10s. 6d. Another way in which the matter might be regarded was to compare the amount paid by the Company for the capital used in the business with the sales of gas. The capital cost in the year 1894-5 12·02d. per 1000 cubic feet, and for 1904-5 9·7d., or nearly 3d. per 1000 cubic feet less. This was one of the safest tests of whether a Company was right or wrong with regard to capital.

The resolution was carried unanimously.

Mr. CORBET WOODALL moved the declaration of dividends at the rate per annum of 14½ per cent. on the "A" ordinary stock, of 11½ per cent. on the "B" stock, and 10¾ per cent. on the "C" stock, less income-tax. He remarked that it did not one bit qualify the satisfaction with which he proposed the resolution, that they had not in the half year quite earned the money that was required to pay the dividends. As the Chairman had remarked, they had accumulated an undivided balance expressly for the purpose of meeting periods such as the past half year had been; and they were drawing upon that balance to the extent of £1500, leaving, within a few pounds, £4000 to be carried forward irrespective of the reserve fund. It was inevitable in the history of gas companies that they should have periods of special prosperity, and the opposite; and the past year, especially with regard to the sale of coke, had unfortunately

been one of the latter. The whole difference between last year's balance of £22,000 and this year's balance of £18,299, was represented by the diminished receipts for coke and the £1000 reduction in the price of gas. He cordially agreed with the Chairman that they had not quite done their duty with regard to the cultivation of the sale of coke for domestic purposes. It was all very well to advise their consumers to burn it. But, so far as he was aware, the appliances in use for domestic fires were elementary and poor; and without affecting the use of gas-fires, they might devote themselves to doing something, and he thought he could promise that they would do something, to bring before the public better stoves for the employment of coke for domestic purposes. The figures that had been given by the Chairman in his last observations with regard to capital account were, he thought, the most interesting of those they had heard from the chair in the course of his long and interesting statement. If he (Mr. Woodall) wanted to judge a gas undertaking by any one criterion, he would rather take the question of the relation of capital to business than any other of which he knew. The Company's increased business was now obtained very largely through prepayment meters. This business cost the Company about 50 per cent. more capital than did the ordinary business. That was to say, if £500 was a fair amount to spend by a gas company upon the ordinary extension of business, it would require about £800 to provide it through prepayment meters. That they had done so much as they had during the last few years in the direction of increasing the number of these prepayment meters, and at the same time had reduced the amount of capital in proportion to the quantity of gas sold, and with it the charge for dividend as against the price of gas, was, he thought, just about as good a testimony as one could have to the (should he say?) watchfulness of the Board, and to the efficiency of their General Manager and officers. With regard to the important event that had taken place in the half year—the amalgamation of the Caterham Company—there could be no doubt it would inure to the distinct advantage of the Croydon Company; and if this were so, he thought the community generally were to be congratulated upon the amalgamation as upon the earlier one with Carshalton, because in Caterham there had been an immediate reduction of 5d. per 1000 cubic feet in the charge for gas; while in Carshalton there had been a reduction of some 18d. per 1000 cubic feet. He had pleasure in proposing the resolution he had read, feeling confident that, in the immediate future, there would be no occasion for further draws upon the undivided balance.

Mr. William Cash seconded the resolution, which was unanimously carried.

In accordance with the notice, and the remarks made by the Chairman in his opening address, a resolution was passed increasing the remuneration of the Directors by £250 so long as the number was eight. This, as explained, was necessitated by the addition to the Board of Mr. Hall, from the Caterham Company's directorate.

Proposed by Mr. A. W. Oke, and seconded by Mr. Samson, the Chairman and Directors were cordially thanked for their services.

The Chairman, having replied, moved a vote of thanks to the officers, staffs, and workmen for their efficient services. Every officer, he remarked, from Mr. Helps, Mr. Topley, Mr. Caddick, and Mr. Sandeman, in their respective posts, had done all that he possibly could in the interests of the Company. As to their relations with their men, he believed the men did appreciate all that the Directors had done, and were doing, for them.

Mr. Samuel Spencer seconded the motion, which was heartily passed.

Mr. Helps, in his acknowledgment, thanked the Chairman for the kindly words he had used towards himself, his staff, and his men. The best feeling existed among the whole of the staff and the men. In concluding his observations, he said he must also thank the Chairman for the kind remarks he had made about the presentation to him (Mr. Helps) of the Birmingham Medal. He could assure those present that not the least pleasant recollection with regard to this presentation was the appreciation his Directors had shown of the honour done him by the gas industry.

Mr. Topley also expressed his sincere thanks on behalf of himself and staff.

This terminated the proceedings.

BOURNEMOUTH GAS AND WATER COMPANY.

Low Leakage—The New Works at Poole—Statistics as to Progress.

The Ordinary General Meeting of this Company was held last Friday, at the London offices, No. 90, Cannon Street, E.C.—Mr. G. Crispe Whiteley in the chair.

The Secretary (Mr. William Cash, F.C.A.) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The Chairman said it was with very great pleasure that, on behalf of his colleagues and himself, he presented to the proprietors for adoption the report and the balance-sheet for the past six months. The half year had not, as a rule, been a grand one for gas companies; but at Bournemouth he thought they had done very well. They had a good increase all round—not perhaps the old-fashioned leaps and bounds of increase of past years, but still substantial enough to give the Board confidence in the undertaking. He had often mentioned the competition with electricity; but he seemed to feel even now, and he daresay the proprietors did so too, that they were holding their own. He had no doubt the proprietors had, as the Directors had done, congratulated themselves upon the action taken by the Corporation of the City of London in again lighting up some of their streets with gas that had been given over to electricity. At Bournemouth, too, owing to the energy and the up-to-date character of their working there, they were making way, and were, he thought, with fair success, fighting their great opponent. Though, when they were staying at an hotel, they still had to switch on the electric light on going to bed, there was at all events a gleam of satisfaction in the thought that, after all, it was in many cases their own gas that had had a great deal to do with the generation of the light. In regard to the results of the half year, there had been two drawbacks (they must not look on one side of the question only) in the accounts on the present occasion. The first was that the residuals had gone down in price; and, consequently, the profit from them was reduced. But he did not think the Directors could control that very much. All they had to do was to see they made the most of them at the prices current. Unfortunately, this brought him to the other drawback—that was, the increase of their expenses. The Board had that morning ordered a new petrol motor so that they might carry their coke about at a cheaper rate, and compete with the reduced price. But the main increase of expense that they had to look for in the future, as well as to bear in the present, was undoubtedly rates and taxes. They were going up; and under the modern trend of communities doing a great deal more for themselves than they did in past days, the Company were called upon to bear their share, and were looked after very keenly to see that they were properly and fully assessed. They were not by any means relieved of their due responsibilities in this matter. However, this was absolutely a thing beyond their control. They would have to face it; and he hoped they would be able to face it successfully. There was one matter he should like to mention on this occasion, and that was the question of leakage. Some years ago, their unaccounted-for gas was somewhat heavy; and their then Engineer and Manager (Mr. Fuller) took the matter in hand, and began the work that their friend Mr. Harold Woodall had carried on with an immense amount of vigour and success—that was, the complete and systematic overhauling of their mains over the whole of the district. He was glad to say the result had been of the most satisfactory character. Corresponding to the amount of work done, there had been a gradual decrease in the leakage, until now they had a result of which one spoke with almost bated breath, and that was a leakage of under 3 per cent. This was a result that was almost unprecedented. He was speaking now in the presence of gentlemen who knew a great deal about these things; and they would agree with him that certainly this was a most satisfactory result, on which they might congratulate their Engineer and the whole of the staff working under him. Of course, their main work just now was the building of new works at Poole. But about them he should not say much on the present occasion, because he hoped at the next meeting to be able to tell the shareholders that they were completed; and he thought perhaps that would be a more appropriate occasion on which to deal with the matter. He was at Bournemouth a few days ago, and was delighted to find the progress made with the works. He should like to assure the proprietors, although the Directors were spending a great deal of money upon these new works at Poole, they were going to have the works in every way up to the latest improvements—the latest ideas in gas-works construction. At the same time, they were confident indeed that the result in the way of economies in the manufacture of gas would be quite sufficient to have made it worth the Company's while to undertake this reconstruction. When he told the proprietors that the coal would be taken right out of the ships and put into the retorts, and such as was not so dealt with would be deposited close by, they would see what economies there would be in the cartage of coal, and that these economies would run into large figures. It was with these hopes and anticipations that they were looking forward to the completion of the new works; and by about Christmas, Mr. Woodall gave them the assurance, the works would be brought into operation. However, he would say more about that on the next occasion, when perhaps they would be able to congratulate both themselves and the staff on what had been done. One other matter touching upon the new works. Of course, they were replacing the old ones, and, as careful and judicious financiers, the Board had faced the question of reducing and writing off, through the profits, the capital value of the old works. Naturally, the Directors were taking care that the proper amount was written off; and they were hoping to partly write it off through the economy of working they would have in the future, and in as few years as possible. It would be noted from the accounts that this year they made a start with £3000 towards this object; and he was sure the proprietors would agree with him that it was not only the proper course to take, but the sooner they had it all written off, and it was only a happy memory of the past, the better would it be for the financial soundness of the undertaking. With such a report and accounts before them, they had nothing more to do but to congratulate themselves upon the continued success of the concern.

Mr. Corbet Woodall, in seconding the motion, said the result of the half-year's working had certainly been satisfactory. They had an increase of about 3 per cent. in the quantity of gas consumed through the ordinary meters, and over 12 per cent. upon that supplied through the prepayment meters; and this gas had been furnished with the carbonization of some 400 tons less coal than in the corresponding period of 1904. The works had been well maintained; and the Chairman had told the proprietors all there was to be said with regard to Poole. Personally, he rather agreed that it was better for one to boast who put off his armour than for him who put it on. He (Mr. Woodall) trusted that, when they had proved the works, all the anticipations of the Chairman would be realized. He, at all events, had no reason to doubt them. With regard to Poole, it was satisfactory to know that the business there had increased materially. The consumers had been greatly benefited by the absorption of the gas-works into the Bournemouth Gas and Water Company; and he thought that the advantage to them was probably to be measured by something like a tenpenny rate upon the town. The quantity of gas sold per ton, which, in his opinion, was an even better standard of working than the amount of the unaccounted-for gas, came out at considerably over 11,000 cubic feet, which was a result upon which they might congratulate their Engineer and themselves.

The motion was unanimously carried.

Mr. R. Hesketh Jones, in moving the resolution for the payment of dividends at the rate per annum of 14 per cent. on the original shares, 7 per cent. on the "B" shares, and 6 per cent. on the preference shares, said he thought that he might direct the attention of the

proprietors and the outside public to what appeared to be the high rate of dividend of 14 per cent. on what he might call the "pioneer" capital of the Company. It looked large; and it might perhaps astonish some few of the consumers. If they went into the matter thoroughly, however, they would see that £50,000 (which he called the "pioneer" capital) was the only capital which was subject to the sliding-scale. The total capital provided by the proprietors and the debenture holders was £644,357; so that the £50,000 of 14 per cent. dividend-paying capital was, they saw, a very small proportion of the total. If they made a little calculation, they would find that the dividends now proposed only averaged about £5 3s. per cent. on the whole of the capital raised by the shareholders and the debenture holders. He was curious enough, in looking into this matter, to turn up a balance-sheet six years old—that was to say, for June, 1899. There he found the dividend paid upon the £50,000 was at the rate of 13 per cent. per annum. Now they were proposing 14 per cent.; but the profits then divided averaged £5 16s., against £5 3s. now. This was accounted for by all the new capital being raised at low rates of interest; and the £5 3s., which was now the average, would be gradually reduced as the new capital was raised. The last issue realized an average of £16 per £10 share, yielding only £4 7s. 6d. to the shareholders who took up the new capital. He thought it was not amiss that this matter should be occasionally brought to the attention of the proprietors and consumers, because some misapprehension might arise regarding the 14 per cent. paid upon a certain amount of the capital.

Mr. S. J. RYMER seconded the motion, which was unanimously carried.

Mr. A. W. OKE proposed a vote of thanks to the Chairman and Directors for their services during the past half year. He remarked that the proprietors had heard some instructive statistics, which showed the sound financial position of the Company. Particularly interesting was the point about the unaccounted-for gas, which seemed extraordinarily small, and showed how very carefully the matter had been looked into by their Engineer. The price of their stock in the market was always good; and they, as proprietors, benefited by the premiums on it. He did not remember coming to a meeting where the state of the finances was in a sounder position. He felt sure the proprietors would approve of the £3000 which was carried as a first instalment towards writing off the cost of the old displaced works. A few days since, he went over the works of a Company of which Mr. Corbet Woodall was the Chairman, and was much struck by the large retort-house that was being erected. He believed it would work out at a very low cost, and would be a great saving to the Company. If he might judge by that of what was going to be done at their own new works, they might look forward to the future in the most sanguine way.

Mr. GLEN seconded the motion, which was unanimously carried.

The CHAIRMAN, in expressing the appreciation of himself and his colleagues, said they were singularly gratified that the results of their efforts were always of so fortunate a character. He then moved a vote of thanks to the General Manager and Engineer (Mr. H. W. Woodall), the Secretary (Mr. Cash), and their staffs, both at Bournemouth and in London. Nothing but the most assiduous effort on the part of their officers and good work from everybody could have brought about a result like that brought before them that day.

Mr. E. L. BURTON seconded the motion.

Mr. HAROLD W. WOODALL, responding for himself and his staff, remarked that he thought the increases were satisfactory. Both the staff at Bournemouth and himself were pleased to find they had not in any way gone back. It had been a bad year for most gas and water companies. But in their own case they had had satisfactory increases; and he thought the proprietors were to be congratulated on them.

The SECRETARY, in replying on behalf of himself and his staff, said with regard to the interesting figures Mr. Jones had given them, of course, Mr. Jones knew, and the shareholders as well, that the dividend on the original shares was paid under the sliding-scale. When they took the figures as to the relative advantage to the consumers and the proprietors under the sliding-scale, they were even more remarkable than those quoted by Mr. Jones. One per cent. dividend on the "pioneer" capital (as Mr. Jones very aptly described it) equalled £500 per annum. A penny for the half year on the gas sold, taking the figures for the last half year, was about £1150. If this was multiplied by eight, they got the relative advantage that the sliding-scale gave to the consumers of gas and to the proprietors. A few other figures might be interesting. He saw that in 1885 the sale of gas was 83 million cubic feet, and they had then 1669 consumers. In 1895, the sale was 224 millions; and the consumers numbered 3300. In 1904 (nine years), the sale was 527 millions; and the number of consumers was 14,000. The prepayment meter had brought up the number of consumers very largely. Turning to the water undertaking, they found equally satisfactory results. In 1885, the revenue was £12,000; in 1895, £20,000; and in 1904, £30,000. The price of water had been reduced twice in that interval; and gas had come down from 4s. to 3s. in nineteen years. Both the Engineer and the Directors had in these figures much to be proud of.

This concluded the proceedings.

The Fire at the Frinton-on-Sea Electricity Works.—As briefly recorded last week, the electricity generating station at Frinton-on-Sea was destroyed by fire early on the morning of Saturday the 19th inst. The station consisted of two 40-horse power gas-engines, working with suction producer gas, each engine driving a pair of dynamos, and a 250-cell accumulator of 240 ampere-hours capacity. The plant was running until half-past eleven the evening before the outbreak; and the building was found to be alight shortly before four in the morning. There is reason to believe that two tramps sleeping under the shelter of the gas-producer were the cause of the fire. There was a strong breeze on Friday night, so that once started the fire very quickly gained a strong hold of the building, which was somewhat of a temporary structure pending extensions. Electricity is the chief illuminant at Frinton, though gas is supplied from the Walton-on-the-Naze Gas-Works.

BARNET DISTRICT GAS AND WATER COMPANY.

The Half-Yearly Meeting of this Company was held on Friday, at the Albion Tavern, Aldersgate Street, E.C.—Mr. A. H. BAYNES in the chair.

The SECRETARY (Mr. Ernest W. Drew, F.C.A.) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving their adoption, said it was not his intention to trouble the proprietors with any lengthened remarks; but there were one or two features with regard to the past half year to which he thought he might call attention. Comparing the six months with the corresponding period of last year, they had carbonized an additional 142 tons of coal; and they had made 1,272,000 cubic feet more gas, and sold 1,260,000 cubic feet more. The total amount sold during the half year had been 51,201,000 cubic feet. The quantity of gas made per ton of coal carbonized was 10,852 cubic feet; and the gas sold per ton, 10,139 cubic feet. In common with other gas companies, they had suffered from the low price of coke; and, on the average, they had incurred a loss in price per chaldron, as compared with the corresponding period of last year, of 13d. They had, however, obtained a somewhat better price for sulphate; and here they made a clear increased profit of 6s. per ton. The total receipts for gas had been £9753, which was an increase of £123. For residuals, they had received £2980; showing a decrease on this account of £141, due mainly to the depressed price of coke. The working expenses exhibited an increase of £256, being almost entirely due to the charges in connection with maintenance and repair. The total profit had been for gas and residuals £3805, as compared with £4099; showing a decrease of £294, which was due partly to the depressed price of coke, and also to the fact that in the last quarter of the half year—that was, from Lady-day to Midsummer—there was a reduction of 2d. per 1000 cubic feet in the price of gas. The total amount of gas made had been 54,800,000 feet; and during the half year 291 yards of new gas-mains had been laid. Turning to the water undertaking, they had pumped into the district during the six months 227,250,000 gallons. The total cash receipts had amounted to £15,214—an increase of £569 on the same period of last year. In the course of the half year, 3647 yards of new water-mains had been laid. The net profit showed a decrease of £164. He ought also to refer to the fact that the Directors had been giving very careful attention to the growing needs of the district with a view to securing a further supply; and quite recently they had accepted a contract for the sinking of a new well at Northaw, from which they quite anticipated they would secure a substantial increase of water. He thought the proprietors would find that the Company was in excellent condition; and that the progress during the half year had been fairly satisfactory.

Mr. I. A. CROOKENDEN seconded the motion, which was unanimously carried.

Proposed by the CHAIRMAN, and seconded by Mr. A. F. PHILLIPS, dividends were declared at the rate per annum of 7½ per cent. on the "A" and "C" stocks, 6½ per cent. on the "B" stock, and 5½ per cent. on the "D" capital gas and water stocks.

Mr. CROOKENDEN moved a vote of thanks to the officers and their staffs. Their officers, he might say with very great confidence, because he had spent 50 years of his life in similar positions, were beyond all praise. The senior officer, Mr. Martin, had been in their service so long that he (Mr. Crookenden) hardly liked to allude to it; but the proprietors knew, as well as he did himself, the worth of their Engineer and Manager. As to Mr. Drew, who succeeded Mr. Alfred Lass in the important office of Secretary, he could conscientiously say that a more deserving and able officer it was impossible to imagine. To Mr. Wright, who superintended the financial matters at Barnet, they also owed a deep debt of gratitude.

Mr. G. GWINN seconded the motion; and it was carried unanimously.

Mr. MARTIN, Mr. DREW, and Mr. WRIGHT all responded.

Moved by Mr. A. W. OKE, and seconded by Mr. H. RAMSBOTTOM, the services of the Chairman and Directors were also cordially acknowledged.

A few words from the CHAIRMAN concluded the proceedings.

PROVINCIAL GAS AND WATER COMPANIES.

Incandescent Burners and Reduced Price Affect Altrincham.

The half-yearly meeting of the Altrincham Gas Company was held last Tuesday, when the report presented by the Directors showed that the profit on the revenue account was £5132, compared with £5764 in the corresponding half of last year. There had been a diminution in the consumption of gas by 4 million cubic feet, largely owing to the more general use of incandescent burners; and having regard to this, and also to a reduction of 2d. per 1000 cubic feet in the first quarter of the year, the Directors considered the result very satisfactory. The balance shown by the profit and loss account as being available for distribution, after transferring £750 to the credit of the suspense account, was £5415; and this was sufficient to pay the full statutory dividends, and leave a balance of £1862 to be carried forward.

How Profits are Divided at Barnsley.

The accounts presented at the annual meeting of the Barnsley Gas Company on Monday last week showed that the revenue from the sale of gas and the hire of meters amounted to £22,256, which was subject to 5 per cent. discount, bringing it down to £21,143. The total receipts were £27,123, and the expenses £19,631; leaving a balance of £7492. The amount available for distribution was £5207; and the Directors recommended that, in addition to the interim dividends paid in March, further dividends should be declared of 5, 3½, and 3 per cent. (less income-tax) on the general stock and the various classes of shares of the Company. The Secretary and Manager (Mr. Walter W. Hutchinson)

made a comparison of the balance-sheet with that of last year, which showed a reduced cost of £792 in manufacture, but £504 increase in distribution. The sale of gas fell off by 6,373,600 cubic feet, representing £1063; and with reduced returns from residuals, and increased discount, the receipts were £2208 less. The Chairman (Mr. E. G. Lancaster), in moving the adoption of the report and balance-sheet, said the latter, as a whole, was not unsatisfactory—their profit being only £125 less than last year—when regard was paid to the grant of extra discount, which made the total profit £8016 against £8141. The profit earned was £488 short to pay the full dividend. This was not due to loss of business, but to extra liberality with their customers. They hoped, with improved trade, that they would be able to earn the difference. The dividend declared was really equal to 8 per cent., which was a respectable, if not an extravagant, one; and he thought they were doing their full share towards helping the public. They paid in rates £2091, one-fourth of what the shareholders received, and they gave £1112 back to their customers; so that the Company had earned five-eighths in the interest of the shareholders and three-eighths in that of the general public. The motion was carried unanimously.

Free Installations at Camborne.

At the recent annual meeting of the Camborne Gas Company, the Directors reported that the result of the past year's working had been highly satisfactory. The chief feature had been the inauguration of free installations and the supply of gas-stoves on the hire system, with slot meters. The accounts showed a satisfactory increase in the quantity of gas sold and profit realized. The Chairman, in moving the adoption of the report and accounts, said they were very satisfactory. The profit was £679, against £645, after placing £60 to the credit of doubtful debts. They had sold 1¼ million cubic feet of gas more than in the previous year; and the number of their customers had increased from 348 to 458. Many of these had had free installations and used slot meters; but there was a satisfactory increase in the ordinary consumers. Camborne was a fairly large area, and the Company's mains were much longer than was generally the case with works supplying about an equal quantity of gas. Although they had extraordinary traffic in all directions, it was gratifying to note that the leakage had decreased, and was now less than in many similar works. They were actually losing less gas than was the average loss by companies throughout the United Kingdom. Competition by the Electric Lighting Company had done them good, for the streets were better lighted than they used to be; and, as he had already said, they had sold 1¼ million cubic feet more gas—a fact which proved that competition was the life of trade. When the Company took over the works, their output was only 8 million cubic feet. It was now over 18¾ millions; and they had plant capable of dealing with 25 millions. He had recently visited the works, and found the machinery, plant, and buildings in excellent condition, which reflected great credit on their Manager (Mr. W. Bailey) and staff. He found the Manager had been associated with the present Company and the Camborne Gas-Works for 45 years; and the continued growth of the prosperity of the undertaking was very gratifying indeed. The report was adopted, and a dividend of 6 per cent. declared.

Good Progress and Bright Prospects at Eastbourne.

Unlike some chairmen of gas companies, Dr. Jeffery, the Chairman of the Eastbourne Company, had a highly satisfactory statement to make to the shareholders when moving the adoption of the report at the half-yearly meeting on Monday last week. There was a balance of £8056 on the revenue account; and a sum of £23,412 was available for distribution. The Directors were therefore in the happy position of being able to recommend a dividend at the rate of 15 per cent. per annum upon the original capital and the "C" shares, and of 12 per cent. per annum on the "B" shares. This would absorb £7837, and leave the substantial balance of £15,575 to be carried forward. Dealing with the working in the six months covered by the report, Dr. Jeffery informed the shareholders that the sale of gas had risen from 169,370,000 cubic feet in the first half of last year to 171,131,000 feet; the increase being 1,861,000 cubic feet. The number of consumers was 4077 ordinary and 3477 with coin meters—together 7554. Last year the total was 7229. The increase, therefore, was 325. The one cloud on an otherwise bright outlook was the reduced price obtained for residuals; the amount being £6199 against £8030, or a falling off of £1831. Against this, however, was to be set the fact that they had paid less for coals, which recouped them to a certain extent. The gas made per ton was 10,324 cubic feet compared with 10,500 cubic feet in the corresponding six months. The coke made for sale per ton showed a slight falling off—being 9·84 cwt., against 10·06 cwt. last year; and the fluctuations in other respects were small. Altogether, the balance-sheet must be deemed a satisfactory one; and in offering the shareholders the maximum dividend, the Directors did so without drawing upon the reserve. The severe depression in trade had engendered a desire for retrenchment and economy; and this was manifesting itself in the substitution of incandescent gas for the electric light, not only in the Metropolis but all over England. Everywhere the cry was "Back to Gas," which had proved so invaluable for street lighting, being both better and cheaper than electric arc lamps. In Eastbourne, as he had said, they had suffered from the reduced price of residuals, due probably to depression in trade; and the lesson to be learnt from this fact was that they must all work together—Directors, shareholders, staff, employees, and consumers—and strive for the best results. They would then maintain the proud position they then held. Alderman Farncombe said he had great pleasure in seconding the motion. As one of the Directors, he could say that the dividend had been fairly earned, and that the whole of the buildings and plant had been kept in a perfectly sound state of repair. The shareholders had, therefore, nothing to fear so far as he was aware; and they might reasonably hope that the present happy condition of things would continue for many years yet to come. The report was adopted, and the dividends recommended were declared. The remuneration of the Directors having been increased from £800 to £1000 per annum, the Chairman expressed the thanks of the Board for this mark of the shareholders' appreciation of their services. Votes of thanks were accorded to the Directors, officers, and workmen.

Gas Supply in North London Suburbs.

The reports presented at the half-yearly general meetings of the North Middlesex and Southgate and District Gas Companies last week bore testimony to the increased gas consumption in the districts served. In the case of the first-named Company, there were 4,168,200 cubic feet more gas sold than in the first half of last year, being equal to 6·5 per cent.; while in that of the latter Company, the extra sales were 3,285,300 cubic feet, or 6·9 per cent. This is very good progress. The result of the half-year's working of the North Middlesex Company was a profit of £3879 on the revenue account, and a divisible balance of £5375; and the Directors recommended dividends at the rate of 5, 10, and 7 per cent. per annum on the preference, original, and additional capital, and the placing of £467 to the reserve fund. The payment of these amounts would leave £2034 to be carried forward. The Southgate and District Company had £3899 available for distribution; and dividends at the above-named rates were recommended. A sum of £2395 was required for the purpose; so that there was a balance of £1504 to be carried forward.

Concession to Power Users at Peterborough.

In the report submitted by the Directors of the Peterborough Gas Company at the recent half-yearly meeting, they stated that the net balance to the credit of the profit and loss account was £5595, out of which they recommended the payment of the maximum dividends. This would absorb £2855, and leave a balance of £2740 to be carried forward. They expressed their pleasure in reporting that they had reduced the price of gas used for lighting purposes from 2s. 11d. to 2s. 10d. per 1000 cubic feet; and to consumers of 25,000 cubic feet per quarter for power purposes from 2s. 9d. to 2s. 6d. The Chairman (Mr. W. Harris), in moving the adoption of the report, said fortunately the history of the half-year's working results could be soon told. The word "success" might be written in large legible letters on every department of the undertaking; for they had never had a better half year. The increase in the consumption of gas over the corresponding period of last year was 2,238,249 cubic feet. During the six months, 138 prepayment meters had been fixed, and 142 cooking-stoves let out on hire; and there were now in use, 1592 stoves and 1118 prepayment meters. They had accepted tenders for the ensuing year's supply of coal at a slight reduction on their former contracts, upon the strength of which they proposed to reduce the price of gas 1d. per 1000 cubic feet. The lower cost of coal would not cover the loss on this reduction; but they had no fear that the result would be unfavourable to the interests of the Company, for gas consumers were rapidly increasing in number. He thought the shareholders would agree that the half-year's results were pretty good for a Company of their size. Alderman Redhead seconded the motion, and it was carried. The dividends recommended having been declared, the meeting was made special for the purpose of obtaining the shareholders' sanction to the promotion of a Bill for the consolidation of the present capital and the raising of more money, the acquisition of additional lands, and for other purposes. The matter was discussed in private; but we learn that the necessary approval was given, and the Bill ordered to be proceeded with as speedily as possible.

Meeting Increased Business at Portsea.

The accounts presented at the half-yearly meeting of the Portsea Island Gas Company last Saturday showed that in the six months ended the 30th of June the total revenue was £96,812, compared with £93,954 in the corresponding period of last year; and that the expenditure was £78,372, against £76,036. The balance carried to the profit and loss account was £18,439; and the sum of £42,895 was applicable to dividend. During the half year, 622,951,000 cubic feet of gas were made, compared with 600,439,000 cubic feet in the corresponding period of last year, and 583,213,800 cubic feet were sold, in comparison with 568,426,700 cubic feet. The Directors recommended dividends ranging from 13 to 5 per cent. on the different descriptions of stock. They reported that the new works at Hilsea were practically complete, and would be brought into operation in the early autumn; also that extensive renewals and repairs at the Flathouse works were contemplated. The mains had been extended to the villages of Purbrook and Waterloo, and in each a number of premises had already been furnished with a supply of gas. In moving the adoption of the report, the Chairman (Sir John Baker) referred to the change in the secretaryship by the appointment of Mr. H. A. Stebbs, of Cardiff, and said he had amply justified all the expectations of the Board. With regard to the condition of the Company generally, though the house supply of gas had been rather less, probably due to the Dockyard discharges, in other departments the increase had continued. The gross amount of revenue was larger by some £2000 than it was at the comparative period of the year 1904. There was a large outlying district of residential property in the villages to which the Company had extended their mains, and their new works at Hilsea had been amply justified; while there were facilities of railroad and other accommodation which hitherto had not been within their reach. Having quoted the great increase in the number of consumers and in the make of gas since 1898, the Chairman said they were doubtless much indebted to the introduction of the incandescent burner. The report was adopted and the dividends recommended were declared. The thanks of the shareholders were accorded to the Directors, as well as to the Engineer and General Manager (Mr. J. D. Ashworth) and the Secretary, and the proceedings closed.

Extended Sphere of Operations at Salisbury.

At the recent annual meeting of the Salisbury Gas Company, the Chairman (Mr. G. Fullford), in moving the adoption of the report and accounts and the payment of the usual dividends, said the work of the Company during the past year had been satisfactory, and he could again congratulate the proprietors on the state of affairs. The Company's Special Act of Parliament gave them the power of supply in the whole of the district included in the newly-enlarged borough; and additional mains had been laid. On Oct. 1 last year, the price of gas was reduced 2d. per 1000 cubic feet, which had meant a concession of more than £600 to the consumers already. The increase in the rates

and taxes was a serious matter, because additional expenditure of this kind militated against any reduction in price to the consumers. This figure had gone up from £868 in 1903-4 to £887 for the past year, and considerably more than £700 of this sum was for local rating. The sales of gas had been well maintained. Residuals, taken altogether, had fetched fair prices; and the maintenance of incandescent burners at a small annual charge had proved satisfactory in every way. The motion having been carried unanimously, the thanks of the shareholders were accorded to the Chairman, Directors, and staff for their services in the past year. The Chairman, in acknowledging the vote on behalf of the Directors, said the affairs of the Company required careful and constant attention. The business had been well maintained, and this could only be secured by careful and economical management. Much depended on the Manager (Mr. Norton H. Humphrys) and the staff, who carried on the operations from day to day. Mr. Humphrys replied on behalf of the staff, who, he said, would highly appreciate this recognition of their services. They had all loyally co-operated with him in bringing about the satisfactory state of affairs just laid before the meeting.

Concessions at Tunbridge Wells.

In moving the adoption of the report of the Directors at the half-yearly meeting of the Tunbridge Wells Gas Company, the Chairman (Alderman Delves) had to confess that their experience during the period covered had been the same as that of most other gas companies—a rather disappointing one. It was not, however, through loss of customers, the number of whom had increased, though not to the extent which the Directors would have liked, owing to the number of unoccupied houses in the town. The reduction of 2d. per 1000 cubic feet in the price of gas made a considerable difference in the revenue, because for the half year it came to £1100. The decrease altogether amounted to £1138; so that if they had not lowered the price their income would have been very much better than it was. The Company had had a considerable increase in the number of consumers on the prepayment system; and they, as well as the others, derived benefit from the reduction of 2d. Then 2s. 6d. was taken off the cost of each public gas-lamp, which was a little more than the town was entitled to. The Company's price per lamp was £3 11s. 6d., whereas the Corporation paid to themselves £3 19s.—out of the ratepayers' money—for their own electric lamps. He thought the Company might fairly leave it to the public to judge whether this difference was represented in the amount of light given. He himself considered the gas-light the better of the two. The Directors had been able to effect some economy during the half year—wages showing a decrease, as well as repairs and maintenance of works; so that, notwithstanding their decreased revenue, they could safely declare the usual dividends. In conclusion, the Chairman moved that interim dividends be declared at the rate of 11½ per cent. on the ordinary stock, 9 per cent. on the "B" stock, and 8½ per cent. on the "C" and "D" stocks, less income-tax; and the proposition was carried unanimously.

Increased Business and New Works at Winchester.

To-day the new gas-works which the Winchester Water and Gas Company have erected at Winnall will be formally opened; and in the course of a few days gas will be made there. In the other branch of the Company's business, a new high-level reservoir on the West Hill, Winchester, now in course of erection, will be completed and brought into use before the end of the year. These two circumstances, coupled with the fact that arrangements are in progress for supplying gas to some outlying districts before next winter, show that the Company's business is increasing. This, indeed, is shown by the accounts which will be presented to the shareholders at their ordinary general meeting to-day. In the six months ending the 30th of June, there were sold 39,910,729 cubic feet of gas, compared with 36,671,800 cubic feet in the corresponding half of last year; the revenue therefrom being £7162, against £6511. The water-rental was £3828, compared with £3660; residuals produced £1495, against £1487; and the receipts totalled £13,101, compared with £12,186. The expenses amounted to £9216, against £9400, and the balance carried to the profit and loss account is £3885, compared with £2785—an increase of £1100. The amount available for distribution is £3263; and the Directors recommend the payment of a dividend at the rate of 4 per cent. per annum on the preference and consolidated ordinary stocks. In doing so, they express the opinion that the interests of the shareholders are best served by the maintenance of the manufacturing and distributing plant in the most efficient condition; and they point out that larger amounts then formerly were expended in maintenance during the half year covered by the report. The works are managed by Mr. H. C. Head, formerly Assistant to Mr. H. W. Woodall, at Bournemouth.

Electricity v. Gas for Technical Schools.—A discussion took place at a recent meeting of the Devonport Town Council, on the question of whether part of the Technical School should be lighted with gas or electricity. The Education Committee recommended the installation of the electric light; but exception was taken to this on the ground that it was a needless expense. Mr. J. H. Bishop moved that the matter be referred back to the Committee, with instructions to afford the Gas Engineer (Mr. J. W. Buckley) an opportunity of giving an estimate for relighting the building with incandescent burners and reporting upon the cost of maintenance and illuminating power. Alderman W. J. Waycott, in supporting this, said that, as owners of the gas undertaking, the Corporation would make a great mistake if they allowed it to be inferred that they thought electric light was superior to gas. Mr. H. Banbury said the Committee recommended the electric light because the heat in the spring and summer was almost unbearable. The Government Inspector had recommended that electric light should be installed in the art room. On a division, the amendment was negatived by 20 votes to 18; and the Committee's recommendation was adopted.

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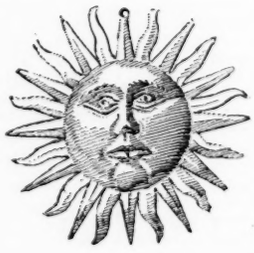

Sun—AUG. 30, 1905.

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BEVERLEY GAS SUPPLY.

A Gratuity Refused to the Gas Manager.

At the Meeting yesterday week of the Beverley Town Council, the Gas Committee reported that, for the twelve months to March 25 last, the profit made was a little less than the previous year; but they had made 3 million feet less gas. The profit was £3891, as against £4156. The 3 million feet would have represented £400 more; so that if they had made the same amount of gas the profit would have been more than in 1903-4. The Committee's recommendation that a gratuity of £25 be paid to the Manager (Mr. F. W. Oldfield) led to some discussion. One member thought it a dangerous precedent, and one that was not fair to the other officials, to single out one official for a gratuity. He did not think that the gas-works were making any more profit than they ought to do; but if the Committee had too much money, they should use it in giving some relief to the ratepayers, who owned the works. The gas and district rate included 3d. per half year for lighting; and if this were reduced 1d. it would mean 2d. a year off the gas and district rate. If the Manager was making more profit than any previous Manager had done, they should take a proper course and grant an increase in his salary. He moved an amendment to refer the recommendation back to the Committee. Another member considered the Gas Manager, by his skill and attention to the works, had benefited the town very largely indeed, both this year and last, and was fully entitled to an honorarium. In his opinion, this was better than giving an advance in salary, because if things were not so satisfactory another year, they need not give a gratuity, whereas an increase in salary would be permanent. If they compared the profits for the last two years with those for the past nine years, he thought they would come to the conclusion that the Gas Manager had made himself quite worthy of being recognized in the manner proposed. The Mayor said he, too, had been surprised that they did not hand over something every year to the rates of the town in addition to what they paid for the drainage loan. In other places he noticed that a certain sum was given year by year. On a vote being taken, the amendment was adopted by 9 votes to 8.

MUNICIPAL FINANCE AT NEWPORT (MON.)

The Secretary of the Newport (Mon.) Ratepayers' Association—Mr. J. P. Elms—has called attention, in a letter to a local paper, to certain matters in connection with the finances of the borough, which certainly require looking into. It appears that at a recent Local Government Board inquiry, the Inspector strongly impressed upon the Council officials that the methods of supplying the sums needed for expenditure upon capital account by means of an overdraft on the bank enabled the authorities to defer the provision of sinking funds for the repayment of the loans, and thus to extend the period granted. This was admitted in the main to be correct; and it was found that, with an overdraft of £149,906 last July, only £11,000 was treated as a specific loan with a sinking fund, about £12,000 was on account of revenue purposes, and the remainder (equal to about £126,906) had no sinking fund provided. In March, 1904, the electricity works capital account showed an overdraft of £50,375; and, assuming an equated period of twenty years for repayment, the additional sinking fund for the year ending March, 1905, would have amounted to £1875, and would have turned the alleged profit of £394 into a loss of £1481. Then it was admitted by the officials that the electricity accounts do not bear any charge for cost of collecting the revenue, or any proportion of the charge for management of the consolidated stock, or of the establishment charges, and that the Llanarth Street works, &c., costing about £100,000, were assessed for rating purposes at only £432. The subject of a provision for replacing worn-out or obsolete plant was not discussed, as it had been very fully considered at a former inquiry; and, as many authorities are now admitting that the sinking funds for the repayment of capital cannot be used for the purpose of replacing such plant, Mr. Elms thinks it is like "slaying the slain" to say anything more about it. But, putting all these facts together, he thinks people will be able to judge of the value of accounts which show a profit of £394 upon these works for the year in question.

HUDDERSFIELD GAS SUPPLY.

Differential Prices for Power Purposes.

At the last Monthly Meeting of the Huddersfield County Borough Council, the Gas Committee recommended that the price of gas should be reduced, from Jan. 1 next, as follows: Lighting, from 2s. 9d. to 2s. 6d. per 1000 cubic feet; stoves and motive power, from 2s. 3d. to 2s. 1d. per 1000 cubic feet, less 5 per cent. discount for payment within one month. Prepayment meter consumers are to have returned to them one penny for each shilling paid into the meter—representing a reduction in price from 1d. per 30 cubic feet to 1d. per 33 cubic feet, which equals 2s. 6d. per 1000 cubic feet. The difference in price is to be repaid to the consumer at the time of collection of the money where possible; and in the event of the consumer not being available, the amount returnable is to be prepaid or returned to the meter. No alteration is to be made in the price of gas for public street lighting. There are now fixed in the borough 11,970 prepayment meters and 3745 cooking and heating stoves.

The confirmation of the minutes having been moved,

Mr. WHITELEY proposed an amendment to the effect that the price of gas for stoves and motive power should be reduced from 2s. 3d. to 2s. 2d. per 1000 cubic feet, instead of to 2s. 1d. as proposed. He understood that the reductions were based on an estimated profit of £7000 a

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	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily
BLACKBURN.	1,250,000	ST. CATHERINES (Remodelled)	250,000	TONBRIDGE	300,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont.)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	YORK (Second Contract)	750,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.	1,800,000
		ACCRINGTON.	800,000	HAMILTON, ONT.	400,000

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft

AND IN ADDITION, 8,150,000 CUBIC FEET DAILY; also Coal-Gas Plants at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

year. They were told that, in order to create a day-load, they must reduce the price as far as possible. Although the cost of the gas was increased from 2s. to 2s. 3d., there had been a greatly increased consumption during the past two years. The users of prepayment meters had also increased in numbers. He did not think they were justified in reducing the price to the extent proposed. During the past few years they had been granting concessions to property owners to the extent of about £500 a year. The speaker also urged the Council to consider the labourers at the gas-works as well as the consumers. The wages of the labourers only averaged 22s. 8d. per week; whereas the Manchester Corporation had recently decided to make their minimum rate of pay 25s. per week for all workmen in their employ.

Mr. WHEATLEY seconded the amendment, and urged the granting of further concessions to the users of prepayment meters, of whom he was one, he added amid laughter.

Alderman JESSOP hoped the Council would pass the minutes as they stood, as nothing fresh had been said by the two members who had spoken to warrant a departure from the resolution of the Committee.

Mr. C. SMITH explained that he had seconded a similar amendment in Committee because he considered they were not making sufficient allowance for depreciation.

The amendment was, however, lost by a large majority, and the minutes were confirmed.

THE MANAGEMENT OF THE TODMORDEN GAS-WORKS.

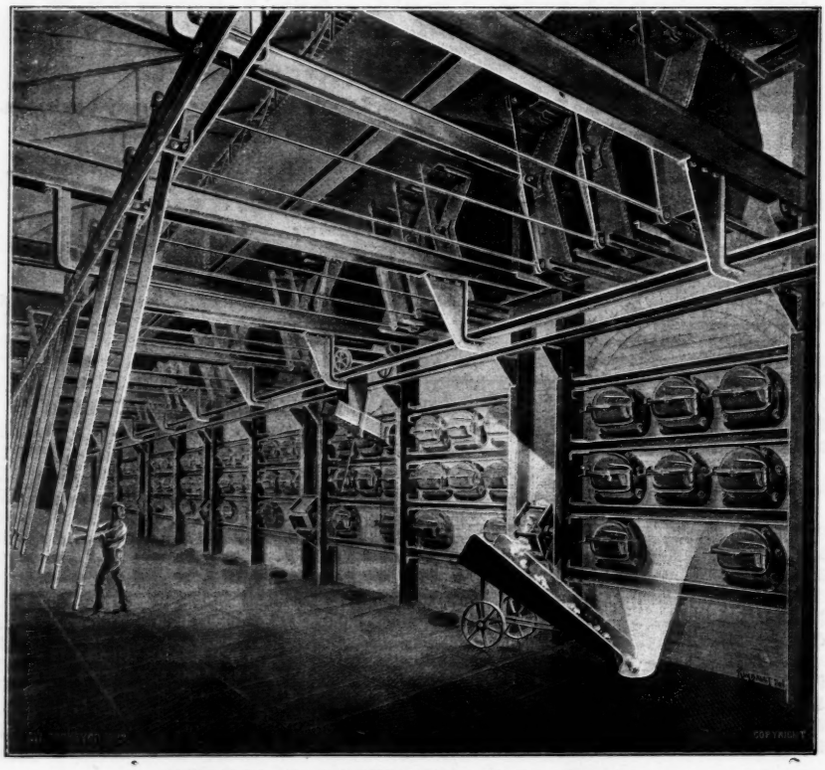
An Impending Change.

Some of our readers may possibly have noticed in the last number of the "JOURNAL" an advertisement, signed by the Town Clerk of Todmorden, inviting applications for the position of Gas Engineer and Manager. The announcement was an intimation that the tenure of these offices by Mr. H. Hawkins is about to end; and as we had not heard that he had sent in his resignation, the inference to be drawn was that he was to be superseded. It appears from an article in a local paper that there were three accusations brought against the Gas Manager which led the Gas Committee to decide on making a change. In the first place, it was stated that there had been tampering with the governors of certain public lamps, with the intention to overcharge the street lighting; secondly, manipulation of the figures in the coal weigh-book; and, finally, the sale of pitch without the sanction or concurrence of the Residuals Sub-Committee. With regard to the first charge, the writer of the article says "the whole story proved to be a *canard*, born in spite and shapen in malice." As to the second, it is declared that what Mr. Hawkins did was not only in accordance with the practice at other gas-works, but with that actually followed in the local mills. Coming to the last charge, Mr. Hawkins is accused of having sold at the rate of 26s. per ton about 70 tons of pitch similar to some which fetched 29s. per ton seven months previously. The explanation given is that at the later period the market price had dropped to 22s. 6d., and that a Cleckheaton contractor, who was in urgent need of pitch for asphalting purposes, offered 3s. 6d. per ton above the current coast rates, because of the difference saved in the carriage, and the advantage of having the material close at hand. As the members of the Sub-Committee could not be communicated with (two, indeed, were away from home), Mr. Hawkins accepted the offer, in the full belief that he was doing a commendable thing. If the facts and the explanations are as stated in the article referred to, Mr. Hawkins does not appear to have committed a very heinous offence. But, at any rate, the position in which he has been placed by the action of the Corporation is sufficiently serious to justify a demand for a thorough inquiry. The full discussion of the matter in the Council or at a public meeting is called for in justice to a public official who for ten years has devoted his best energies to the service of the town.

PROGRESS OF THE CO-PARTNERSHIP SYSTEM.

The Annual Co-operative Festival was opened at the Crystal Palace last Wednesday, with an exhibition of goods produced in labour co-partnership workshops; the ceremony being performed, in the presence of a large gathering, by Mr. W. Crooks, M.P. The principal meeting in connection with the festival took place the next day, under the chairmanship of Mr. Allen, of Blaina, the President for the year; and among those present was Mr. Henry Austin, one of the Workmen-Directors of the South Metropolitan Gas Company. The annual report set forth that the Labour Co-Partnership Association had just completed 21 years of activity. Among private firms and companies there had been no important extension of the principle of labour co-partnership during the past year, although the firms practising the principle were producing results which, from the Association's point of view, were very gratifying. In the case of the workmen's co-partnership societies, the very serious depression of trade which was passing over the country had prevented any great increase in their turnover and had reduced their profits. It was a matter for congratulation, however, considering the extent of the depression and the damage it had done to ordinary concerns, that the co-partnership societies were pulling through satisfactorily. Five societies were lost and five were gained last year. The statistics for 1903 and 1904 showed that the number of co-partnership societies in each year was 126. The capital of these concerns rose from £1,666,801 in 1903 to £1,795,771 last year, or an increase of 7½ per cent.; the sales increased from £3,226,530 to £3,529,545, or 9 per cent.; and the profits from £179,854 to £206,465, or 15 per cent. But the losses went up from £2532 to £5276; and there was a drop in the dividend on wages from £23,356 in 1903 to £21,524 in 1904. With reference to "the transformation of capitalism," the report stated that in five companies, employing about 8000 people, adopting the principle of co-partnership, the workmen had received

INCLINED RETORTS.



PATENT "DWARF" INCLINED BENCH.

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No Gas-Works is complete unless the above are in use.

Write for Estimates.

NEW CONVEYOR Co., LTD., SMETHWICK.

during the year £60,000 as their share of profit; the percentage on wages of the dividend to labour varying from 9¾ per cent. in the highest to 3 per cent. in the lowest. The total aggregate dividends to labour under the co-partnership system in these five firms had amounted to £344,000, or an average of £43 per employee, and they had about £314,000 invested in the capital of the companies, or an average of nearly £40 per employee. When it was remembered that in only one case had the principle been adopted more than five years, these figures were, it was said, eloquent as to the gain to labour under the system.

In the course of his address, the President pointed out that the Labour Co-Partnership Association promoted a system in which capital, labour, and organized consumption were associated on terms equitable to each—a system which enabled the worker to occupy a high place in the industrial community by sharing the profits of industry, and taking an intelligent part in its responsibilities. They aimed, through the Association, to increase the material resources at the command of the industrial population, and to enlarge the opportunities of social and industrial development. They did this, not by depriving any class, or interest, or individual of what might lawfully or exclusively belong to it, but by a purely voluntary process, on the principles of mutual help and associated ownership. If they gave the worker a direct share in the profits, the capital, the control, and the responsibility of his life's work, they afforded him an inducement to look beyond the mere receipt of a weekly wage. As a co-partner he would come to realize the rights and risks of capital as well as the rights and risks of labour. Modern industry was continually asking for a system which would combine the greatest degree of efficiency with economy. Co-partnership was the answer. It placed industry on a basis more satisfactory to all concerned. The national welfare depended upon industrial peace. All strikes meant loss to capital, labour, and the community. Even artificial curtailment of output was no remedy. Stop-days and similar methods constituted serious drawbacks to the employment of the common stock. Unemployment was not settled either by limitation of output or Act of Parliament. On the other hand, the gain was great in efficiency and economy from a system which proved that its first care was to interest the operative in his work. While the present industrial conditions continued, it was not to be wondered at that antagonism, strikes, industrial wars, and widespread distress existed. By removing the causes on the methods laid down by the Association, they increased, and not decreased, the wealth-producing capacity of the nation. Altogether, they were justly proud of the large number of co-partnership industries whose high aim was to produce honest commodities. The co-operative societies had a membership of 2,205,942, and were feeding and clothing one-seventh of the population of the British Isles.

A discussion took place on the report, in the course of which Mr. Austin gave details of the working of the co-partnership scheme in his Company, with which our readers are familiar. He remarked that the results to the employee made him better off than the ordinary wage-earning workman, and enabled him to retire from work earlier; thus giving a greater chance to the younger and more able-bodied man. In addition to the co-partnership scheme, the Company had a workmen's building society to which they had lent out £10,000 to enable the employees to purchase their houses. They were able to measure some of the success of these schemes by the fact that the Company supplied the cheapest gas in London, while they paid good wages, and gave a bonus to the employees, and had a fortnight's wages so that they might have a holiday.

The report having been adopted, Mr. T. C. Taylor, M.P., was unanimously elected President of the Association for the ensuing year. Mr. Taylor is head of the woollen concern of Messrs. J. T. & J. Taylor, Limited, of Batley, which, like the South Metropolitan Gas Company, Messrs. Thomson's, of Huddersfield, and other private companies, are being worked on labour co-partnership lines. Messrs. Taylor's firm employs 1200 workers, who last year received a dividend of 10 per cent. on their earnings or wages, and capital amounting to 10 per cent., in addition to 4½ per cent. fixed, or 14½ per cent. in all. Declaring these results, Mr. Taylor said the system was one which tended to bridge over the chasm between capital and labour, which was so inimical to the welfare of the country; and it had been one of his great aims, in formulating and carrying out the system, that all the employees should be shareholders.

Saturday was the social and recreative day of the festival, and large numbers of people attended from all parts of the country. The proceedings closed with the passing of the following resolution: "That this meeting recognizes in co-operation and co-partnership two of the best means for raising the condition of the people, and promoting a more equitable distribution of wealth, and heartily commends them to both workmen and employers of labour."

Incandescent Gas Lighting in Mills.—In consequence of the injunction obtained by the Anti-Vibration Incandescent Lighting Company, Limited, of Otley, against certain manufacturers of similar appliances, which was upheld in the Court of Appeal, as already reported in the "JOURNAL" (Vol. XC., pp. 591, 728), the Company some time ago served a notice on practically all the manufacturers of Burnley and a large number in different parts of Lancashire, requiring a royalty of 2s. 6d. per light, and costs, for every anti-vibration appliance which was an infringement of their patents. As it may be calculated that there is one such light for every three or four looms in the district, it will be readily understood that the claim was one of considerable magnitude, and meant a large sum in the case of certain firms, who, innocently enough, had had their mills completely fitted up with an installation of these lights. As a result of negotiations which have taken place between the Central Committee of the North and North-East Lancashire Cotton Spinners' and Manufacturers' Associations and the Anti-Vibration Company, the members of the Associations will be able to settle the claim by payment of 1s. per light, without costs.

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AGENCIES IN ALL LARGE TOWNS.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The thirty-first annual meeting of the Nairn Gas Company, Limited, was held last Wednesday. It was stated in the report of the Directors that under their new Manager—Mr. J. Barber—the affairs of the Company had been conducted quite satisfactorily. The Directors were gratified to find that their forecast of last year had been fulfilled. A dividend at the rate of 4 per cent. was recommended, which would leave a balance of £370 to be carried forward. Extensions and improvements on the works were reported to be making satisfactory progress, and would, it was expected, be completed about the middle of October. The report was approved of.

The Banff Gas Company had a make of gas last year amounting to 8,132,500 cubic feet—about the same as the year preceding. The revenue from gas was £1995, and from residuals £128. After meeting all charges, and allowing £60 for depreciation, there was a net profit of £266, out of which the customary dividend was paid. The gas is enriched by benzol, and the Manager—Mr. W. Marshall—is thoroughly satisfied with the process.

The pollution of the River Dee is a perennial source of interest, if not more, to the water authorities of Aberdeen; it being from this river that the city water supply is obtained. A memorandum upon the subject has been prepared this summer by Mr. W. Dyack, the Burgh Surveyor, which makes rather ugly reading. Twelve places—villages and gentlemen's houses—were reported to have the sanitary equipment of cesspools, some of which were said to be in a filthy condition, and all of which overflowed, either directly into the river, or into tributaries of it. The best protection is at Balmoral Castle, where plant for dealing with sewage was put down about ten years ago. A party of about twenty members of the Aberdeen Town Council made an inspection of the river this week. Leaving on Tuesday morning, they went as far as Braemar, and returned to the city on Thursday evening. In the course of the three days, they made a very careful inspection of the banks of the river, and of the various sources of pollution. As the result of the inspection, the almost unanimous opinion of those who took part in it was that the Corporation must go elsewhere than to the Dee for the water supply of the city. Mr. Wilson, the Convener of the Water Committee, declared emphatically, at Braemar, that the only pure supply of water which they could get was from the River Avon. This is a scheme which has been under consideration for some years, but has been held back, in view of measures being taken for the prevention of pollution. This inspection has revealed the points of pollution to be so very numerous, and, besides, the almost absolute impossibility of supervising remedial measures, that it is likely the Avon scheme will now be pushed forward. At a meeting of the Water Committee yesterday, it was intimated that during the past year they had been able to replace £10,350 to the additional sinking fund, which was £200 more than was estimated, and that a sum of £19,802 had been paid off the debt—reducing the total debt of the department to £115,551. It was resolved to impose a domestic water rate of 7d. in the pound, and a public rate of 1⅛d. in the pound.

I wrote a week or two ago that the Edinburgh and District Water Trust had water in store which, excluding gain in the interval, would serve the district till the 29th of September, which is the day after the inauguration of the new Talla water supply. The official figures issued this week show that since then there has been a further decrease in the quantity of water in the reservoirs of nearly 163 million gallons, and that the amount now in store is only 836,440,000 gallons, compared with 2,278,337,000 gallons at the corresponding date last year. Though there has been an enormous decrease in quantity, the situation has considerably improved, which is due to the fact that the supply has been reduced from 38 to 34 gallons per head per day. On the same calculation as before, the water in store is sufficient to last for 54 days, which would carry the period of exhaustion down to 18 days after the introduction of the Talla water. In the meantime, the situation has been further relieved by frequent falls of rain; so that everything points to the danger of famine having passed. The dry nature of the season is shown by the fact that the rainfall at Glencorse since the 1st of January—16·18 inches—has been less by 11 inches than it was in the corresponding period of last year: and that at Gladhouse, where it has been 15·12 inches, it is less by 8 inches.

A scheme for the extension of the water supply of Millport, of which Mr. T. O. Niven, of Glasgow, is the Engineer, is about to be carried out. On Monday last, the Town Council, at a special meeting, let the contract for the execution of the work to Messrs. P. M'Bride and Co., of Port-Glasgow, whose tender was £6467.

CURRENT SALES OF GAS PRODUCTS.

Week ending Aug. 26.

The London market for tar products is still rather quiet. As to pitch, it is stated that a considerable sale has recently been made for this half year which will realize from 29s. 6d. to 30s. per ton net at sellers' works. In sulphate of ammonia, the position continues very firm, and further small advances are reported for prompt stuff; while for forward, there is still a fair demand. London ordinary creosote of standard quality has realized 1⅞d. net during the week; and the demand is good. There has again been a considerable inquiry from the Continent for crystal carbolic acid, and the price is expected to be well maintained. This should favourably affect crude carbolic acid. 90 per cent. benzol remains firm.

LIVERPOOL, *Aug.* 26.

Sulphate of Ammonia.

Throughout the week there has been good demand, and at the close higher prices are being paid; the quotations being £12 5s. per

The "Positive"

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ton f.o.b. Hull, and £12 10s. per ton f.o.b. Liverpool and Leith. Direct buyers have not been much in evidence, so that the bulk of the supply has again been taken for covering August contracts. The advanced prices required for October-March and January-June delivery have checked operations over these periods, and buyers have gone on to January-October and April-September, 1906, at £12 10s. per ton f.o.b. Leith.

Nitrate of Soda.

This article is, owing to continued scarcity of supplies, firm on spot, and quotations are 10s. 3d. and 10s. 9d. per cwt. for ordinary and refined qualities respectively. Spring delivery, ordinary quality, is quoted at 10s. 3d. per cwt.

LONDON, *Aug.* 26.

Tar Products.

There has not been very much business doing during the past week; and although prices have been fairly well maintained, the demand is scarcely so good as was the case a little while ago. Carbolic acid continues very quiet. Sales are again reported in 60's at 1s. 7¾d., although it is difficult to ascertain what makers are accepting this price. The largest producers still quote 1s. 9d. forward; but consumers are not prepared to pay anything over 1s. 8d. at present, and do not make firm offers even at this price. There is still a fairly good inquiry for crystals; but English makers have evidently accepted 6⅝d. f.o.b. for 39-40 per cent. on more than one occasion during the past few days. In anthracene, there is absolutely nothing whatever to advise. The position remains precisely the same, and there does not appear any likelihood of an improvement for some time to come. Benzol continues steady, but is hardly so firm at the close. London makers are still fully sold, and are unable to deliver anything before September. It is reported, however, that dealers have arranged business at 9½d. during the week for September shipment; while an offer of 9¾d. for September-October was declined. In 90 per cent., there is no business doing. English consumers are not now purchasing, and Continental buyers do not seem to take any interest in this quality just at the moment. The demand for toluol is still very good, and one or two parcels have been placed during the week at prices equal to 9d. and 9¼d. f.o.b. The principal London makers of creosote are still very firm in their ideas; but consumers do not seem at all anxious to purchase, and the salty oil, which is offering rather freely, does not find buyers. In Yorkshire, some small sales are reported at 1¼d. for prompt, although the larger makers ask 1⅜d.; while there does not appear to be any business doing in the Lancashire district. There is nothing fresh to advise in pitch. South Wales consumers are still open to contract for all over next year, but only at prices which dealers decline to entertain; while on the Continent consumers appear to be well supplied, and only offer prices for forward delivery, which render business impossible just at present. London makers are still firm in their ideas; but there are several parcels offering in the Lancashire district at proportionately low prices, which do not find ready buyers.

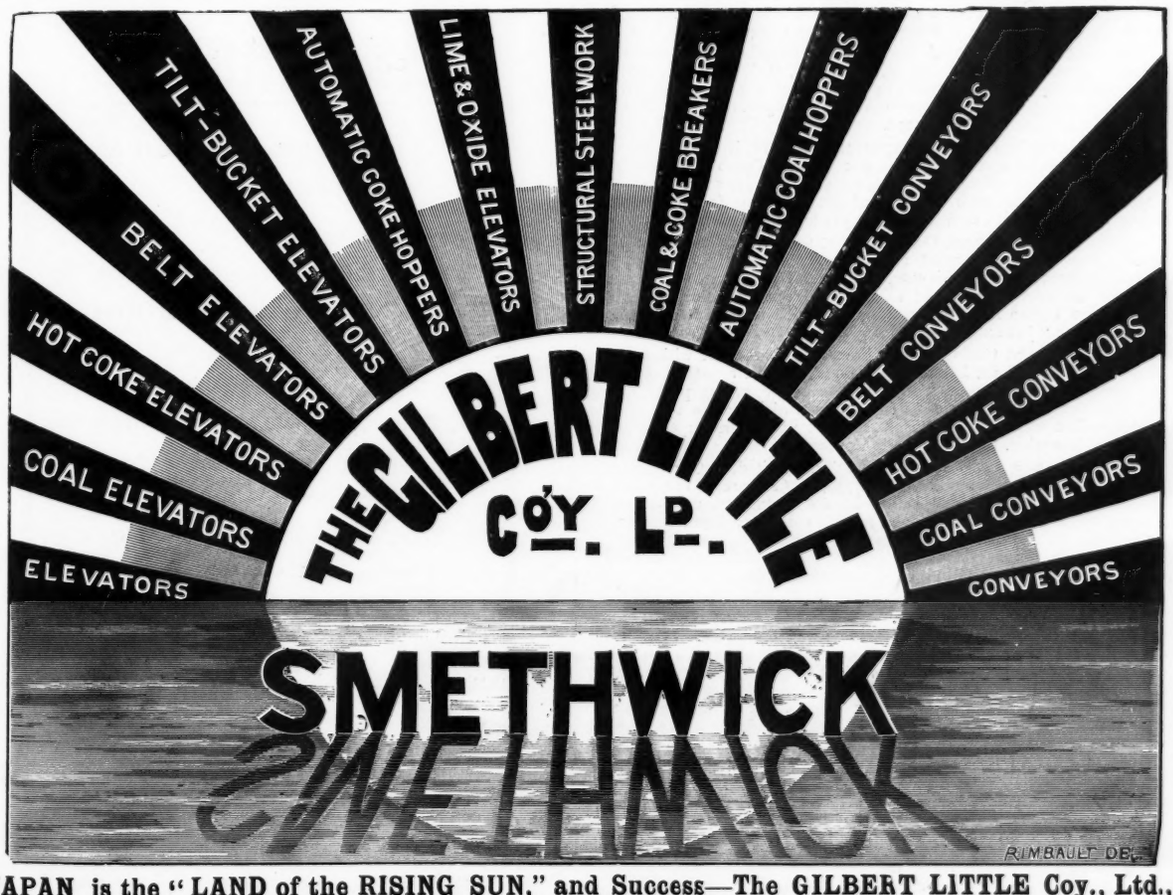
The average values during the week were: Tar, 16s. to 21s. Pitch, London, 28s. 6d. to 29s.; east coast, 28s. to 28s. 6d.; west coast, 25s. 6d. to 26s. Benzol, 90 per cent., 9⅛d. to 9¼d.; 50-90 per cent., 9d. to 9¼d. Toluol, 8½d. to 8⅝d. Crude naphtha, 3⅛d. to 3⅛d.; solvent naphtha, 8½d. to 9d.; heavy naphtha, 10d. to 10½d. Creosote, London, 1 9/16d. to 1 11/16d.; North, 1¼d. to 1⅜d. Heavy oils, 2d. to 2 1/16d. Carbolic acid, 60 per cent., 1s. 8d. Refined naphthalene, £4 10s. to £8; salts, 12s. 6d. to 14s. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market has been very steady during the week, and closes with a firm tone. Beckton are not offering in any position; but the nominal quotation may be taken as £12 12s. 6d. South Metropolitan report having done a fairly large business during the week, and have now raised their quotation to £12 15s., on their own terms. There is really very little offering in Hull. Sales are reported to have been made at £12 7s. 6d. to £12 8s. 9d. The market in Leith is very firm; and there is considerable inquiry for forward delivery. Some of the largest makers are reported to have declined £12 10s. for August and September, for which they quote £12 12s. 6d., and in some instances even a little over this. There are also several inquiries for delivery over the early part of next year; but business does not appear to have resulted at present—makers declining to accept the prices offered by buyers. In Liverpool, the market is decidedly firm; and £12 7s. 6d. to £12 8s. 9d. may be taken as the nominal quotation.

Consumption of Gas through Slot-Meters at Coventry.—The Gas Department of the Coventry Corporation are sending out notices to some users of slot-meters, calling attention to the small quantity of gas consumed by this means on their premises during a certain period. It is pointed out that the expense incurred in putting in the meter and stove is considerable; and that unless more gas is required by the consumer in future these appliances will be removed after due notice has been sent. It appears that the lowest quantity of gas consumed for twelve months must not come to less than 25s.

Proposed Reversion to Gas for the Public Lighting of Preston.—At the meeting of the Preston Town Council on Thursday, the Streets and Buildings Committee will submit for approval a recommendation to do away with the electric light; and the Council will be invited to give the National Electric Supply Company, Limited, three months' notice terminating the agreement for the supply of electricity to the public lamps. It is proposed to substitute 95 incandescent gas-lamps with two lights each, at a cost of £614 6s. 3d. The Gas Company have intimated their willingness to pay £150 towards the cost of the substitution; and this offer has been accepted on the understanding that it in no way binds the Corporation to the adoption of gas.



JAPAN is the "LAND of the RISING SUN," and Success—The GILBERT LITTLE Coy., Ltd., is equally so as Conveyor and Elevator Specialists.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Trade in house coal varieties continues very quiet; but for burgy and slack the demand keeps up well. The threatened strike in the cotton trade having been obviated, there has been more inquiry. For the moment, however, the coal trade is affected by the series of holidays which follow each other in the various towns in rapid succession. So far as slack is concerned, there is so little made just now that what is produced is taken away as fast as it comes. There has been more inquiry for coke from the North; and prospects seem brighter. In gas coal and cannel, the deliveries under contracts are increasing on account of the shorter days. Contracts for this class of coal and cannel may be considered as settled for the year. Steam coal for bunkers is quiet; and coal for shipping is steady. There is no change to report in prices.

Northern Coal Trade.

The demand for coal shows steady growth, and there is, with a good shipment, a growing home use, so that the output of the chief collieries is well taken up. Best Northumbrian steams are well maintained at 9s. 6d. per ton f.o.b., and some of the chief pits have sold freely forward. Second-class steams are 8s. 6d. per ton, and steam smalls are rather scarce at from 4s. 10½d. to 5s. 9d. In the gas coal trade, the demand is now enlarged, and will, with the next month, attain even greater dimensions. For occasional shipment, cargoes of Durham gas coal are quoted at from 7s. 9d. to 8s. 3d. per ton f.o.b., according to quality. As to contracts, there have been a few small ones placed for gas coal for export—at prices that are very near those that ruled under the sales thus replaced. In one case, it is supposed that German coals have partly ousted Durham gas coals for shipment to an Austrian town, owing to the lower price of the former. Coke is generally steady. Gas coke is a little more plentiful; but the price is practically without change from the figures last given.

Scotch Coal Trade.

There is again a slight improvement in trade; the signs of betterment being more apparent than they have been for some time. Prices all round are firmer, and it is anticipated that better prices may now be looked for. Ell and splint of the better qualities are in strong request, and in some cases advance has already been got. The quotations are: Main, 7s. 3d. to 7s. 6d. per ton, f.o.b. Glasgow; ell, 8s. to 9s.; and splint, 8s. 6d. to 9s. The shipments for the week amounted to 291,813 tons—an increase upon the previous week of 12,276 tons, and upon the corresponding week of last year of 33,465 tons. For the year to date, the total shipments have been 7,604,630—an increase upon the corresponding period of 478,800 tons.

Mr. Charles Ferns, formerly representative in Scotland of Messrs. R. & A. Main and Messrs. Thomas Glover and Co., has accepted an appointment as sole representative for Scotland of Metropolitan Gas Meters, Limited, taking up his new duties on the 4th prox.

At a recent meeting of the Queenstown (Cape Colony) Town Council, it was announced that Mr. Gellatly, of King Williamstown, had been engaged for two years, at a salary of £1000 per annum, to take entire charge of the construction of the Bongolo reservoir, recently provided for by Act of Parliament.

By an advertisement which appears elsewhere, it will be seen that the Sheppy Gas Company are inviting tenders for £5000 of consolidated ordinary stock, limited to a maximum dividend of 5 per cent. per annum. The stock will be issued in amounts of not less than £10, or multiples thereof. Tenders will be accepted, at par and upwards, till Sept. 16.

The Chemical Engineering Company, and Wilton's Patent Furnace Company have secured an order for a complete sulphate of ammonia plant from the Staveley Coal and Iron Company, Limited, and also an order for one of their round open saturators for the Stourbridge Urban District Council, for which tenders were recently invited in the "JOURNAL."

The Longwood Gas Company have placed an order with Messrs. R. Dempster and Sons, Limited, of Elland, for their patent charging and discharging machinery with complete coal-handling plant. It is expected that the apparatus will be in operation before the coming winter. The work has to be carried out under the supervision of Mr. J. H. Brearley, the Company's Engineer.

Under the title of Wright and Butler, Limited, a Company has been registered, with a capital of £20,750, in £1 shares, to acquire the business of the Wright and Butler Lamp Manufacturing Company, Limited (incorporated in 1892, and now in voluntary liquidation), and to carry on the business of lamp and stove manufacturers, brass and iron founders, metal and glass workers, chandelier manufacturers, engineers, &c. There will be no initial public issue.

A project which the city officials of Los Angeles (Cal.) have announced is a 260 million gallon water supply, to cost £4,600,000, according to "Engineering News." The interest of the scheme arises from the fact that the water is to run through a 240-mile conduit, the source of the proposed supply being the head waters of the Owens River, on the eastern slope of the Sierras, in Inyo County. A concrete conduit 15 feet wide is proposed, and there would be about 17 miles of tunnel. This is believed to be only American project for obtaining a supply of water from so great a distance.

Messrs. J. & W. B. Smith, Farringdon Road, E.C., have purchased from Mr. C. Houghton-Brown, the Liquidator of the Empire Intensified Gaslight Company, Limited, of Victoria Street, Westminster, and York Mansions, S.W., the goodwill and patent rights of the Somzee-Greyson burners for incandescent gas lighting, for both low-pressure and in combination with their patent compressors for high-pressure lighting, as well as the "Empire" inverted incandescent gas-lamp (Bartlett's patent), and the special valve arc lamps, together with all tools, machinery, &c., necessary for making the articles named, and the bulk of the finished and unfinished burners, compressors, &c.

TITLE PAGE

OF OUR

NEW PAMPHLET.

[ESTD. 1826.]

Trade Mark

"CANNON."

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A Study in "Automatics."

The present is an age of "Automatics."

It is . .
"Automatics" for this,
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THIS pamphlet, however, treats the subject from a larger aspect, and shows how the same principles of this modern and ingenious enterprise may be extended in their operations, to the benefit of those Gas Undertakings whose conditions demand a well regulated and "Automatic" demand for Gas, with its consequent increase of profits.

PLEASE ASK FOR A COPY,
Which will be sent free on application.

An offer from the Richmond Gas-Stove Company is under consideration by the Belfast Gas Committee, that the Company should take over the Corporation stove department and work it entirely themselves, having a warehouse in one of the most important streets in the city with the stoves on exhibition. Each member of the Committee has been supplied with a copy of the proposed agreement, so that it may be further discussed at a subsequent meeting.

At the Acetylene Congress recently held at Liége, several discussions arose on the subject of impurities in calcium carbide and commercial acetylene. The possible danger arising from the presence of gaseous impurities in the acetylene was debated, and it was pointed out that the employment of pure limestone free from phosphates, in order to avoid the introduction of phosphide into the carbide, would in many cases greatly increase the cost of production.

WANTED, FOR SALE, CONTRACT, &c. ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ENGINEER AND MANAGER. Todmorden Gas Company. Applications by Sept. 16.
MAIN AND SERVICE LAYER (SOUTH AMERICA). No. 4453.
STOKER. No. 4449.

Situations Wanted.

MANAGER OR SUPERINTENDENT. No. 4454.
PURCHASING DEPARTMENT OR SHOW ROOM. No. 4455.
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CHEMICAL FOREMAN. No. 4450.
GAS FITTER. Gas, Pembroke Dock.
GAS FITTER. No. 4452.
WORKING FOREMAN. Watson, Torquay.
WORKING MANAGER. No. 4447.

Plant, &c., for Sale.

BRIDLINGTON GAS COMPANY.
LAMPS.
STATION METER. No. 4448.

Tank Waggons on Hire.

CLAYTON ANILINE COMPANY.

Stocks and Shares.

NEW CONVEYOR COMPANY.
SHEPPY GAS COMPANY. Sept. 16.
TICEHURST AND DISTRICT WATER AND GAS COMPANY. Sept. 1.

TENDERS FOR

Benzol.

RADCLIFFE AND PILKINGTON GAS COMPANY, Tenders by Sept. 5.

Coal and Cannel.

ROCHDALE GAS DEPARTMENT. Tenders by Sept. 6.
STRATFORD GAS DEPARTMENT. Tenders by Sept. 2.

Coke.

RAMSGATE GAS DEPARTMENT. Tenders by Sept. 9.

Meters.

GLASGOW GAS DEPARTMENT. Tenders by Sept. 11

Oxide of Iron.

EDINBURGH AND LEITH GAS DEPARTMENT. Tenders by Sept. 11.

Sulphuric Acid.

ROCHDALE GAS DEPARTMENT. Tenders by Sept. 6.

Tar.

RADCLIFFE AND PILKINGTON GAS COMPANY. Tenders by Sept. 5.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 554.

Issue.	Share.	When ex Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
500,000	10	Apl. 13	10½	Alliance & Dublin 10 p.c.	21½—22½	..	4 13 4
160,000	10	,,	7½	Do. 7 p.c.	14½—15½	..	4 16 9
200,000	5	May 12	6½	Bombay, Ltd.	6½—7	..	4 12 10
140,000	5	,,	6½	Do. New, £4 paid	5—5½	..	4 14 6
50,000	10	Mch. 15	14	Bourne-mouth Gas and Water 10 p.c.	29½—30½	..	4 11 10
251,810	10	,,	7	Do. B 7 p.c.	16½—17½	..	4 0 0
53,200	10	,,	6	Do. Pref. 6 p.c.	15½—16½	..	3 12 9
380,000	Stk.	Aug. 16	12½	Brentford Consolidated	247—252*	+2	4 19 2
300,000	,,	,,	9½	Do. New	187—192*	+2	4 19 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	125—130*	..	3 16 11
206,250	,,	June 15	4	Do. 4 p.c. Deb.	103—106	..	3 15 6
220,000	Stk.	Mch. 15	11½†	Brighton & Hove Orig.	225—230	..	5 0 0
246,320	,,	,,	8½†	Do. A. Ord. Stk.	165—170	..	4 17 1
460,000	20	Mch. 30	10	British	42—43	+½	4 13 0
100,000	Stk.	Aug. 16	6	Bromley, Ord. 5 p.c.	117—122*	..	4 18 4
165,700	,,	,,	4½	Do. do. 3½ p.c.	88—92*	..	4 17 10
500,000	10	May 12	7	Buenos Ayres (New) Ltd.	12—12½	+¼	5 12 0
250,000	Stk.	June 29	4	Do. 4 p.c. Deb.	95—98	+1	4 1 8
150,000	20	July 13	8½	Cagliari, Ltd.	24—26	..	6 6 11
100,000	10	May 31	10	Cape Town & Dis., Ltd.	17—17½	..	5 14 3
100,000	10	Apl. 28	4½	Do. 4½ p.c Pref.	10—10½	..	4 5 9
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
50,000	Stk.	June 29	4½	Do. 4½ p.c. Deb. Stk.	101—103	..	4 7 5
1,400,000	Stk.	Feb. 24	5⅛	Commercial 4 p.c Stk.	118—121	+1	4 6 0
560,000	,,	,,	5	Do. 3½ p.c. do.	113—116	+1	4 6 2
450,000	,,	June 15	3	Do. 3 p.c. Deb. Stk.	87—89	+1	3 7 5
800,000	Stk.	,,	6	Continental Union, Ltd.	108—113	..	5 6 2
200,000	,,	,,	7	Do. 7 p.c Pref.	137—142	..	4 18 7
424,070	Stk.	—	5½	Derby Con. Stk.	124—126	..	4 7 4
55,000	,,	June 3	4	Do. Deb. Stk.	108—110	..	3 12 9
486,090	10	July 28	11	European, Ltd.	22—23	+½	4 15 8
354,060	10	,,	11	Do. £7 10s. paid	14½—15½	..	5 6 5
15,223,235	Stk.	Aug. 16	4⅛	Gaslight and Coke 4 p.c. Ord.	99½—100½*	+½	4 7 7
2,600,000	,,	,,	3½	Do. 3½ p.c. max.	91—93*	+1	3 15 3
3,799,735	,,	,,	4	Do. 4 p.c. Con. Pref.	109—111*	..	3 12 1
4,193 975	,,	June 15	3	Do. 3 p.c. Con. Deb.	88—90	+1	3 6 8
258,740	Stk.	Mch. 15	5	Hastings & St. L. 3½ p.c.	100—103	..	4 17 1
70,000	10	Apl. 28	11	Hongkong & China, Ltd.	18½—19½	+½	5 12 10
3,800,000	Stk.	May 12	10	Imperial Continental	212—214	+½	4 13 6
473,600	Stk.	Aug. 16	3½	Do. 3½ p.c. Deb. Red.	94—96*	..	3 12 11
175,242	Stk.	Mch. 15	6	Lea Bridge Ord. 5 p.c.	120—125	..	4 16 0
561,000	Stk.	Aug. 16	10	Liverpool United A	222—224*	..	4 9 3
718,100	,,	,,	7	Do. do. B	166—167*	..	4 3 10
306,083	Stk.	June 29	4	L'rpool Unit'd Deb. Stk.	111—113	..	3 10 10
75,000	5	,,	5	Malta & Medn., Ltd.	4—4½	..	5 11 1
560,000	100	Apl. 1	5	Met. of Melbourne 5 p.c. Deb.	102—104	..	4 16 2
250,000	100	,,	4½	Do. 4½ p.c. Deb.	102—104	..	4 6 7
541,920	20	May 31	3½	Monte Video, Ltd.	11—12	..	5 16
1,565,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con.	106—107	..	4 6 5
406,625	Stk.	June 29	3½	Do. 3½ p.c. Deb.	96—100	+2	3 10 0
15,000	10	Feb. 24	10	North Middlesex 10 p.c.	19—20	..	5 0 0
52,940	1?	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	Stk.	May 12	8	Oriental, Ltd.	145—148	..	5 8 1
600,000	5	Mch. 30	7	Ottoman, Ltd.	6—6½	..	5 12 0
168,255	Stk.	—	6½	Plym'th & St'house 5 p.c.	—	..	—
398,490	5	Apl. 28	6	Primitiva Ord.	6—6¼	..	4 12 4
796,980	5	July 28	5	Do. 5 p.c. Pref.	5⅞—5⅝	−⅛	4 13 0
488,900	100	June 1	4	Do. 4 p.c. Deb.	97—99	+1	4 0 10
851,070	10	Apl. 28	7	River Plate Ord.	12½—13	..	5 7 8
300,000	Stk.	June 29	4	Do. 4 p.c. Deb.	96—98	+1	4 1 8
250,000	10	Apl. 13	7	San Paulo, Ltd.	12⅞—13¼	..	5 5 8
70,000	50	July 1	5	Do. 5 p.c. Deb.	51—53	..	4 14 4
135,000	Stk.	Mar. 15	10	Sheffield A	238—240	..	4 3 4
209,984	,,	,,	10	Do. B	238—240	..	4 3 4
523,498	,,	,,	10	Do. C	238—240	..	4 3 4
126,106	Stk.	Mch. 30	5½†	Shrewsbury Ord. 5 p.c.	107—110	..	4 15 5
70,000	10	May 31	10	South African	16—17	..	5 17 8
6,250,000	Stk.	Aug. 16	5½	South Met., 4 p.c. Ord.	130—132*	+1	4 3 4
1,895,445	,,	July 13	3	Do. 3 p.c. Deb.	88—90	..	3 6 8
575,000	Stk.	Aug. 16	5½	S'th Suburb'n Ord. 5 p.c.	120—123*	..	4 9 5
60,000	,,	,,	5	Do. 5 p.c. Pref.	122—127*	..	3 18 9
112,533	,,	July 13	5	Do. 5 p.c. Deb. Stk.	130—135	..	3 14 1
502,310	Stk.	May 12	5	Southampton Ord.	109—112	..	4 9 3
87,950	,,	—	4	Do. 4 p.c. Deb.	—	..	—
120,000	Stk.	Feb. 24	6¼	Tottenham and Edmonton A 5 p.c.	125—128	..	4 17 8
363,620	,,	,,	4½	Do. B 3½ p.c.	98—101	..	4 14 1
125,000	,,	June 29	4	Do. 4 p.c. Deb.	105—108	..	3 14 1
182,380	10	June 15	8	Tuscan, Ltd.	9½—10	..	8 0 0
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	100—102	..	4 18 0
30,000	Stk.	Aug. 16	7½	Wandsworth A 5 p.c.	—	..	—
255,636	,,	,,	6¼	Do. B 3½ p.c.	137—140*	+2½	4 9 3
60,000	,,	,,	5¼/240	Do. C 3½ p.c.	113—116*	+2½	4 13 6
57,564	,,	June 29	3	Putney 3 p.c. Deb. Stk.	82—85	+1	3 10 7
745,872	,,	Aug. 16	5	West Ham 5 p.c. Ord.	101—103*	+1	4 17 1
185,000	,,	,,	5	Do. 5 p.c. Pref.	122—125*	+1	4 0 0
193,300	,,	June 29	4	Do. 4 p.c. Deb. Stk.	104—109	..	3 13 5

† Next dividend will be at this rate. Prices marked * are "Ex div."

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.
JOHN WM. O'NEILL,
Managing Director,
PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

DUTCH OXIDE OF IRON.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

THE First Dutch Bogore Co., Ltd., HOLLAND.
General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

OXIDE OF IRON.
(NATURAL.)

BALE & CHURCH will be pleased to send Quotations and Samples on application.
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT for all Retort and Furnace work.
PAINT for Gasholders, Purifiers, &c.
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, & MESSEL, LTD.
(with which is amalgamated WM. PEARCE & SONS, LTD.)
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341, AVENUE.

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia. BROTHERTON AND CO, LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

AMMONIACAL Liquor wanted. BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

PATENTS AND TRADE MARKS PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d. MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants. We guarantee promptness, with efficiency for Repairs. JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON. Telegrams: SATURATORS, BOLTON. Telephone 0848.

THE KEITH LIGHT.
OVER 2000 INSTALLATIONS IN DAILY USE.
SEE illustrated advertisement in next week's issue.
JAMES KEITH AND BLACKMAN CO., LTD., 27, Farringdon Avenue, LONDON, E.C.

"NUGEPE" GAS PLANT CEMENT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

GLASS SHADES of every description, for all kinds of Interior **GAS LIGHTING.** Illustrated sheets on application.
JOHN WALSH WALSH,
SOHO AND VESTA GLASS WORKS, BIRMINGHAM.
Telegrams: "VESTA, BIRMINGHAM."
National Telephone: No. 63.
London Show-Room: 4, HOLBORN CIRCUS, E.C.

BROTHERTON & CO., LIMITED. Offices: Commercial Buildings, LEEDS. Correspondence invited.

CORNELIUS BORST & CO.,
AMSTERDAM.
DUTCH BOG ORE
for
GAS PURIFICATION.

BIGGS, WALL, & CO., 13, Cross Street, Finsbury, E.C. *Telegrams:* "RAGOUT," LONDON. *Telephone:* 273 CENTRAL.

EXHAUSTING PLANT—See Advt. in last week's issue.
SULPHATE PLANT—See Advt. in this week's issue.
CHARGING MACHINERY—See Advt. in next week's issue.

SPENT OXIDE.
THE South Metropolitan Gas Company are always open to receive OFFERS of SPENT OXIDE.
Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "METROGAS, LONDON."

GAS TAR wanted. BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

TAR AND LIQUOR WANTED.
Best Prices paid.
DENT AND CO.,
Ouse Chemical Works, SELBY.

TO LET ON HIRE.
CYLINDRICAL Tank-Waggons, suitable for the carriage of Benzol or Crude Naphtha. Apply CLAYTON ANILINE COMPANY, LIMITED, Clayton, MANCHESTER.

THE Gas-Works Development Syndicate are prepared to purchase Gas-Works for Cash. Preference given to a property where there is room for development.
Apply, by letter, with full Particulars, in confidence, addressed to the SECRETARY as above, 119, LONDON WALL, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters. Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

TO BE SOLD, Gasholder, 30,000 cubic feet capacity; another 15,000 feet capacity. Both new and ready for delivery.
The WRIGHT GAS PLANT COMPANY, LIMITED, 181, Queen Victoria Street, LONDON, and SHIPLEY GATE.

THE Bridlington Gas Company invite OFFERS for the whole or any part of 200 to 300 Copper Frame Rectangular GAS-LAMPS and Cast-Iron POSTS, in good condition as when in use, which have been displaced by Electric Light.
Details on Application to JOHN KELLY, Secretary and Assistant Manager, Gas-Works, BRIDLINGTON.

FOR SALE.—A second-hand Station Meter, in good condition. Capacity, 20,000 cubic feet per hour.
Offers to No. 4448, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

BOROUGH OF TODMORDEN.
WANTED, a Gas Engineer and Manager. Commencing Salary at the rate of £200 per annum, payable monthly.
Applications to be made on prescribed form, which will be supplied by, and must be returned to, the Town Clerk, before Sept. 16, 1905.
Canvassing, direct or indirect, will absolutely disqualify.
By order,
D. SUTCLIFFE.
Town Clerk.

STOKER required in a small Gas-Works on the South Coast. Eight or Twelve hour shifts, according to season. Regenerator Furnaces. Wages 4s. per shift. Give Reference as to Character, which must bear investigation.
Apply, by letter, to No. 4449, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Main and Service Layer for South America. Climate healthy.
Apply, by letter, stating Experience, &c., to No. 4453, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO Gas Companies Advertiser seeks responsible position in Purchasing Department or Show-Room of a Country Gas Company. Twelve Years' Experience, in responsible position, with Manufacturer and Contractor of Brass Gas-Fittings of every description to principal Southern Companies; also Contracting Gas-Fitter. Excellent Reference.
Address No. 4455, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED Re-engagement as Work-ING FOREMAN or MAIN and SERVICE LAYER, or any place of Trust. Practical Gas-fitter, Sulphate Maker, &c., Abstainer. Excellent Testimonials and References.
Address, G. WATSON, Orchard Cottage, Hele, TORQUAY.

SITUATION wanted as Assistant to Gas Engineer and Manager, or MANAGER of medium-sized Gas-Works. Eight Years' Practical Experience in the general management of a Gas-works. Total abstainer. Excellent Testimonials.
Address, No. 4451, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

COMPETENT Engineer requires appointment as MANAGER or SUPERINTENDENT of Gas-Works. Has held similar position for some years. First-class References.
Address No. 4454, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SITUATION wanted by a Steady, Re-liable WORKING MANAGER. Well up in all details of Manufacture and Distribution, Fixing Meters and Cookers, Main and Service Laying, &c.
Address No. 4447, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-FITTER of good address wants re-engagement. Well up in Fitting, Main and Service Laying, Meter Inspecting, and Slot Installations. Age 25. Good References.
Address GAS, 14, Arthur Street, Pembroke Dock, SOUTH WALES.

GAS-FITTER, First-Class, with Tools, wants Situation. Highest References.
Address No. 4452, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CHEMICAL Foreman requires situa-tion. Thoroughly Experienced in Manufacture of Ammonia Sulphate, Muriate, and Liquid, Prussiates of Soda, and Potash and Prussian Blues. Good References. Moderate Salary.
Address No. 4450, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

RAMSGATE CORPORATION.
(GAS AND WATER DEPARTMENT.)

THE Committee invite Tenders for the Purchase of their surplus COKE from the 1st of October, 1905, to the 30th of September, 1906 (probable quantity, 2000 to 3000 Tons), delivered free on rail or free into barge, Ramsgate; purchaser paying dues.
Further Particulars, together with Conditions and Form of Tender, may be obtained from the undersigned.
Tenders to be sent in not later than Noon on Saturday, Sept. 9, 1905, addressed to the Chairman of the Gas and Water Committee, Boundary Road, Ramsgate, and endorsed "Tender for Coke."
The Committee do not bind themselves to accept the highest or any Tender.

T. N. RITSON,
Engineer and Manager.

Gas and Water Offices,
Boundary Road, Ramsgate.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

THE Commissioners are prepared to receive TENDERS for the supply of about 500 Tons of OXIDE OF IRON suitable for Gas Purification purposes delivered into Waggons ex Ship, Granton Harbour, free of all charges, or in Railway Waggons (North British or Caledonian Railways), Granton Gas-Works.
Intending Contractors will be required to furnish the Engineer with the fullest information as regards the material to be supplied, the percentage of effective Ferric Hydrate ($Fe_2 O_3 H_2 O$) in the mass after the evaporation of the moisture at a temperature of 212° Fahr.
The Contractor must also state the maximum percentage of moisture in the mass on delivery at the Gas-works.
Further Particulars may be obtained upon application to Mr. W. R. Herring, Chief Engineer and Manager, Gas-Works, New Street, Edinburgh.
Tenders to be lodged, at or before Ten a.m. on Monday, the 11th day of September, 1905, sealed and endorsed "Tender for Oxide of Iron," and addressed to the undersigned.
The Commissioners do not bind themselves to accept the lowest or any Offer.

JAMES M'G. JACK,
Clerk

25, Waterloo Place, Edinburgh, Aug. 10, 1905.

STRATFORD-UPON-AVON CORPORATION.
(Gas Department.)

THE Gas Committee invite Tenders for the Supply of 5000 Tons of good Screened GAS COAL or NUTS, for delivery during the Twelve Months ending Sept. 30, 1906.

Forms of Tender and other Particulars can be obtained upon application to the Engineer and Manager.

Tenders to be sent in, and will be accepted only on the forms supplied, not later than Sept. 2, 1905.

The lowest or any Tender not necessarily accepted.

J. S. Cranmer,
Engineer and Manager.

August, 1905.

BOROUGH OF ROCHDALE.

TO COAL OWNERS AND OTHERS.

THE Gas Committee of the above Corporation invite TENDERS for the supply of about 55,000 Tons of Screened GAS COAL or NUTS for a period of Twelve Months from the 1st of September, 1905.

Forms of Tender may be obtained on application to Mr. T. Banbury Ball, the Manager, at the Gas-Works, Dane Street.

Tenders, endorsed "Coal," must be sent in to me not later than Wednesday, Sept. 6, 1905.

By order,
Wm. Henry Hickson,
Town Clerk.

Town Hall, Rochdale,
Aug. 26, 1905.

BOROUGH OF ROCHDALE.

TO MANUFACTURING CHEMISTS AND OTHERS.

THE Gas Committee of the above Corporation invite TENDERS for the supply of BROWN OIL OF VITRIOL as required during a period of Twelve Months from the 1st of September, 1905. The Vitriol to be 148° to 150° Twaddel, free from Arsenic, and delivered at the Gas-Works, Dane Street, as required; the approximate total quantity being 600 Tons.

Tenders, endorsed "Vitriol," must be sent in to me not later than Wednesday, Sept. 6, 1905.

By order,
Wm. Henry Hickson,
Town Clerk.

Town Hall, Rochdale,
Aug. 26, 1905.

RADCLIFFE & PILKINGTON GAS COMPANY.

TAR AND BENZOL.

THE Directors of this Company invite TENDERS for the purchase of 850 Tons of the surplus TAR, to be produced at their works in Radcliffe during the ensuing Twelve Months.

Also Tenders for the supply of the Company's requirements of BENZOL.

Particulars may be obtained from the undersigned, to whom Tenders must be delivered not later than Tuesday, the 5th of September.

James Braddock,
Manager and Secretary.

Gas Offices, Radcliffe,
Aug. 24, 1905.

GLASGOW CORPORATION.
(Gas Department.)

TENDERS FOR METERS.

THE Corporation of Glasgow invite TENDERS for the supply of DRY METERS for Twelve Months from date of acceptance of offer.

Forms of Tender may be obtained on application to Mr. Alexander Wilson, the Engineer, at his office, No. 45, John Street, Glasgow, and sealed Tenders, endorsed "Gas Department—Tender for Meters," must be lodged with the Subscriber, on or before Monday, the 11th of September next.

The Corporation do not bind themselves to accept the lowest or any Tender.

John Bowers,
Town Clerk.

City Chambers, Glasgow,
Aug. 25, 1905.

To Investors and Premium Seekers in Progressive Water and Gas Companies.

THE TICEHURST AND DISTRICT WATER AND GAS COMPANY

ARE PREPARED TO SELL BY TENDER NOT LATER THAN SEPTEMBER 1,

1000 Ordinary Shares of £5 each

IN LOTS OF FIVE SHARES.

Entitled to rank for Dividend not exceeding the rate of £10 per cent. per annum, to be issued under the powers and subject to the provisions of "The Ticehurst and District Water and Gas Acts, 1902 and 1904."

MINIMUM PRICE, £5 PER SHARE,

£2 10s. per Share to be paid on acceptance of Tender, and the balance on or before the 20th day of September, 1905.

Attention is drawn to the fact that applicants for lots of 10 or more Shares will be given a preferential claim to the allotment of Debenture Stock at par, which the Directors propose to issue, notice of which will be given.

Forms of Application and Tender may be obtained on application to The Water and Gas Debenture Trust, Limited, 37, High Street, Tunbridge Wells; Lloyds Banks; and the Company's Offices, 99, Cannon Street, London, E.C.

SHEPPY GAS COMPANY.

SALE BY TENDER OF £5000 OF CONSOLIDATED ORDINARY STOCK,

Subject to a Maximum Dividend of 5 per cent.

Minimum Price, £100 per £100 of Stock.

THE Directors of the Sheppy Gas Company are about to issue a portion of the Additional Capital authorized by the Sheppy Gas Act, 1904, and they invite TENDERS for the sum of £5000 of CONSOLIDATED ORDINARY STOCK, limited to a maximum Dividend of 5 per cent. per Annum. No Tender of less than £100 per £100 of Stock will be considered.

The present Capital of the Company consists of 400 Preference £10 "A" Shares bearing a dividend of 4 per cent., and £63,000 Consolidated Ordinary Stock, limited to a 5 per cent. dividend (this Stock is the result of the conversion of 2100 £10 "B" Shares bearing a 10 per cent. dividend and 1500 £10 "C" Shares bearing a 7 per cent. dividend, which were converted by the Sheppy Gas Act, 1904, into an equivalent 5 per cent. Stock), and £4000 on loan.

The Company commenced business in 1859 as a limited liability Company, and in consequence of the development of their business further powers were necessary, and the Company was re-incorporated under a Special Act of Parliament in 1871.

The area of supply consists of the whole of the Isle of Sheppy, in Kent, containing the important Dockyard and Garrison town of Sheerness and the ancient borough of Queenborough which has a considerable and increasing mercantile trade.

The Sale of Gas amounted to 88,700,000 cubic feet in 1904, being an increase of 35,000,000 over the issue of 1895. There was an increase in the number of consumers during 1904 amounting to 9 per cent.

The full Dividends have been paid since 1863 and the Reserve Fund is up to the amount allowed by the 1871 Act, the new Act only having come into force this year.

The Dividends are paid about the last week in March and September, and the Stock now offered will carry a dividend as from the 1st of October next.

The liability of the Stockholder is limited—that is, when the Stock is paid for, there is no further liability whatever.

The Stock will be issued in amounts of not less than Ten Pounds, or multiples thereof, and will be allotted to the highest Tenderers.

Tenders will be received at the Company's Offices not later than the 16th of September, and the balance of the purchase-money must be paid in full not later than the 30th of September, 1905.

Forms of Tender may be obtained from the Secretary of the Company.

Sheppy Gas Company's Offices.
2, Trinity Road, Sheerness,
Aug. 8, 1905.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including in Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at Mr. Alfred Richards' Offices, 18, Finsbury Circus, E.C.

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HANDBOOK FOR GAS ENGINEERS AND MANAGERS.—By Thomas Newbigging, M.Inst.C.E. (7th Edition. *Price* 18*s. net.*

THE VALUATION OF GAS, ELECTRICITY, AND WATER-WORKS FOR ASSESSMENT PURPOSES.—Second Edition. By Thomas Newbigging, M.Inst.C.E., and William Newbigging, Assoc.M.Inst.C.E. *Price* 5*s.*

PRACTICAL PHOTOMETRY: A GUIDE TO THE STUDY OF THE MEASUREMENT OF LIGHT.—By W. J. Dibdin, F.I.C., F.C.S., late Chemist and Superintending Gas Examiner to the London County Council. *Price* 7*s.* 6*d.*

CHEMICAL TECHNOLOGY.—Electric Lighting. By A. G. Cooke, M.A., A.M.Inst.C.E. Photometry. W. J. Dibdin, F.I.C., F.C.S. 1 Vol. *Price* 20*s.*

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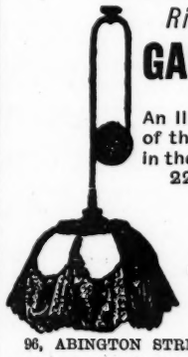

An Illustrated Description of this Pendant appeared in the "Journal" for Nov. 22, 1904 (page 599).

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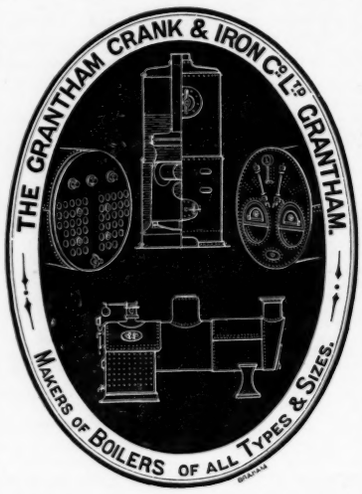

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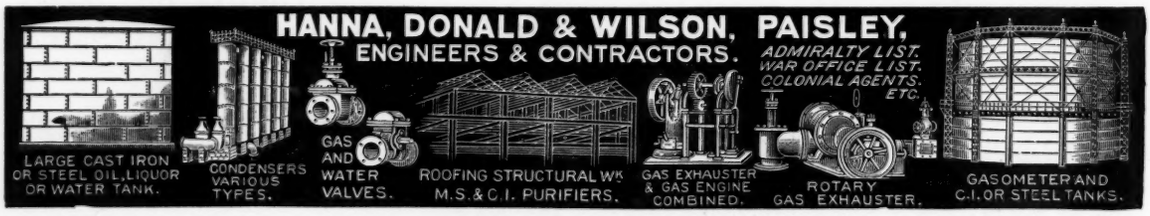
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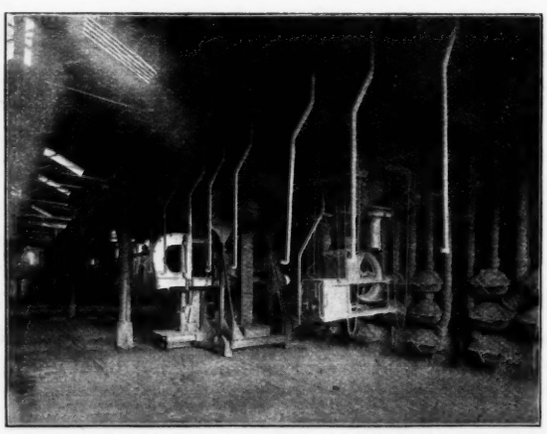

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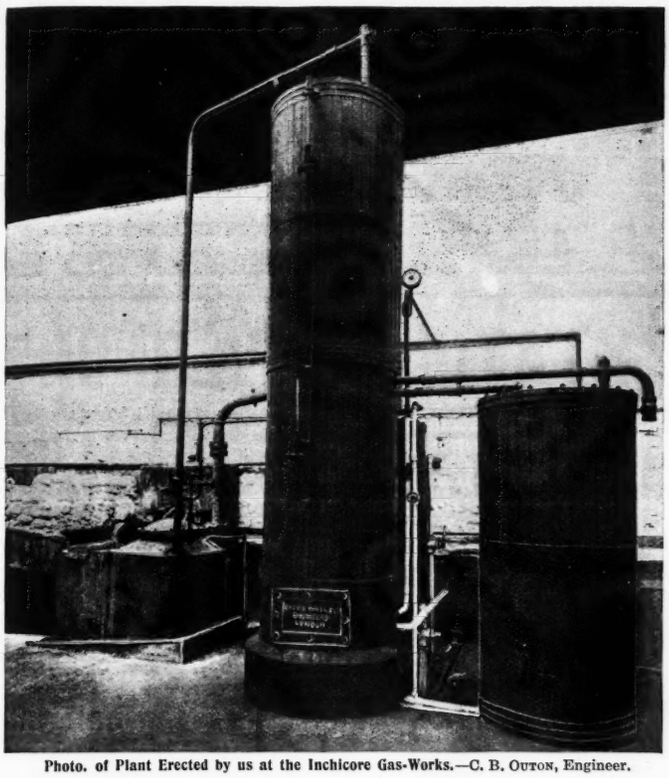

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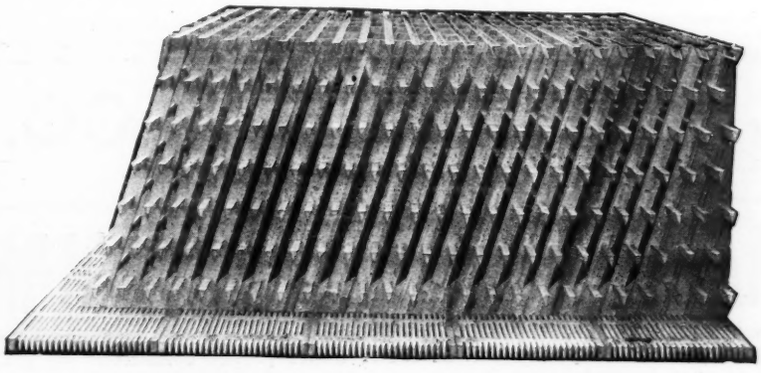

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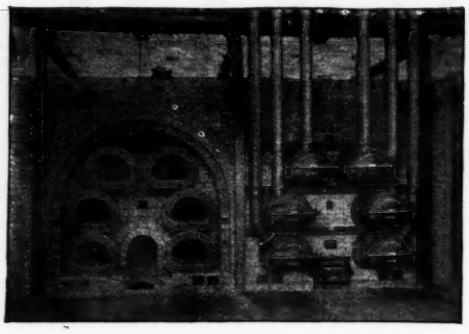

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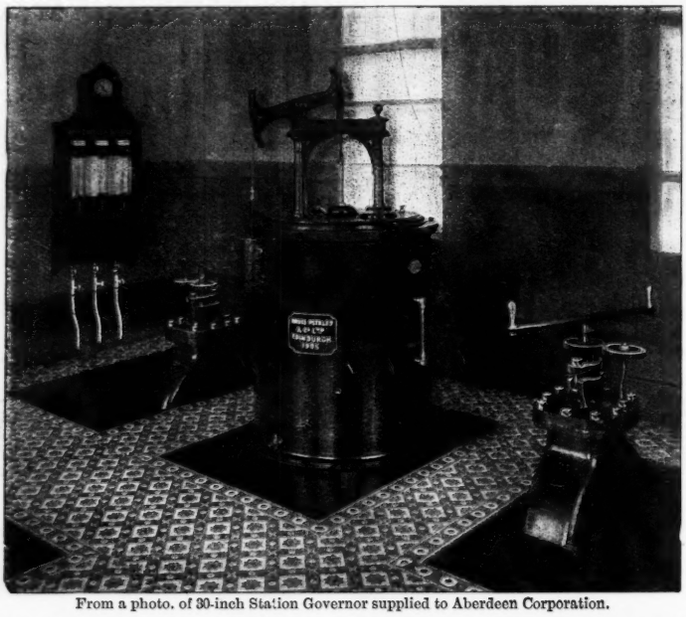
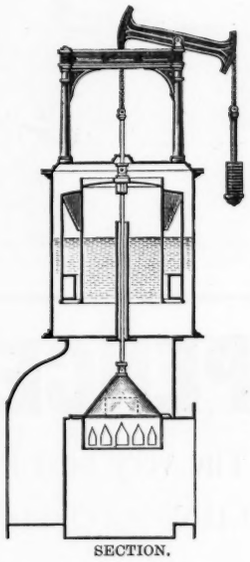


From a photo. of 30-inch Station Governor supplied to Aberdeen Corporation.



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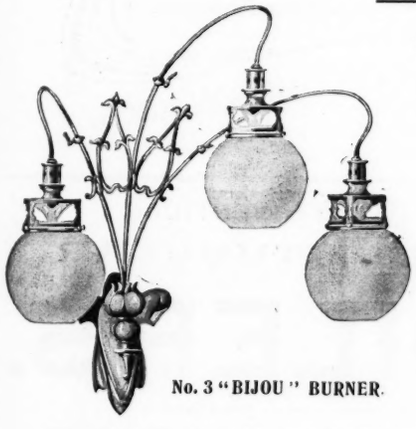

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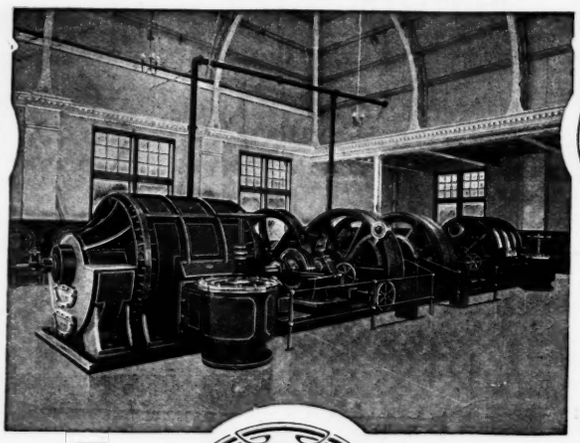

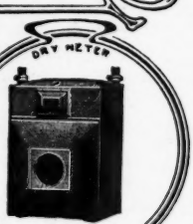

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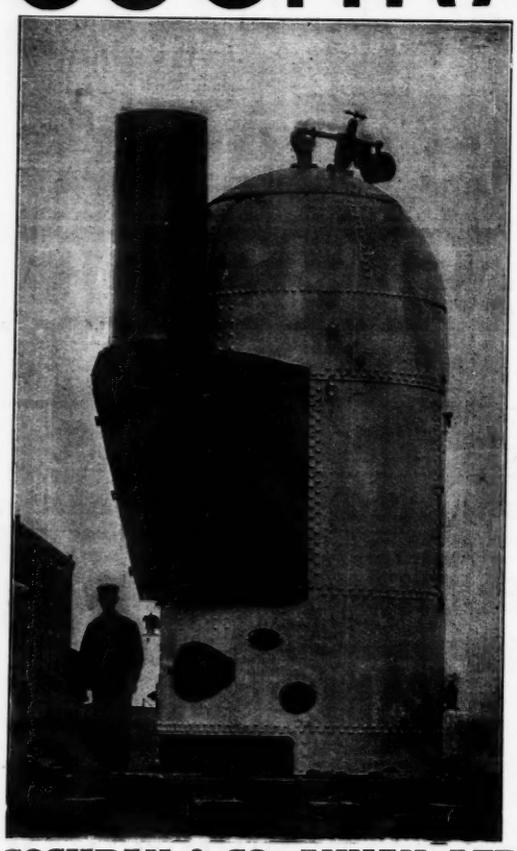

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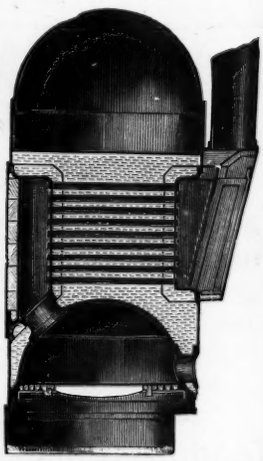

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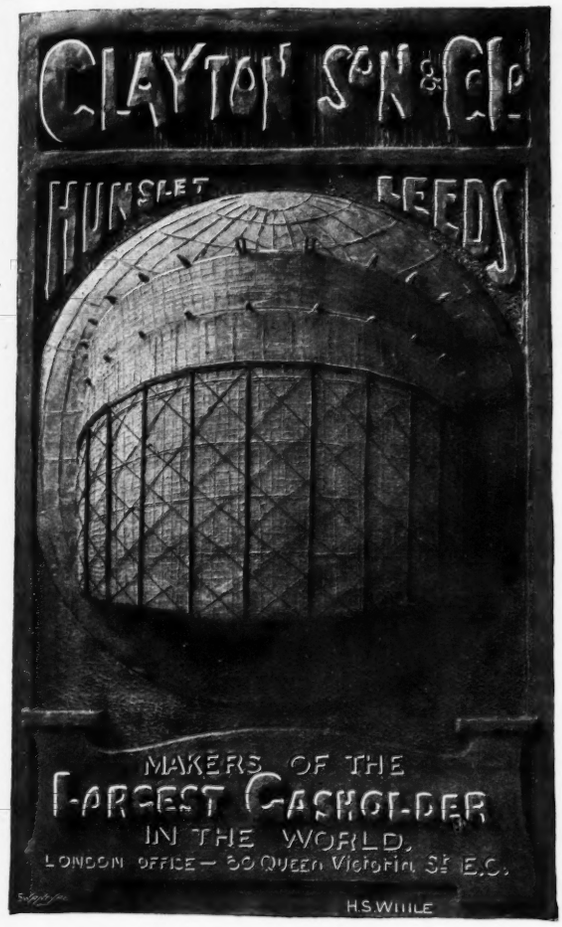

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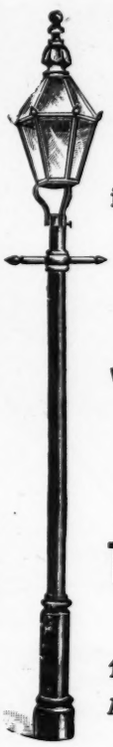

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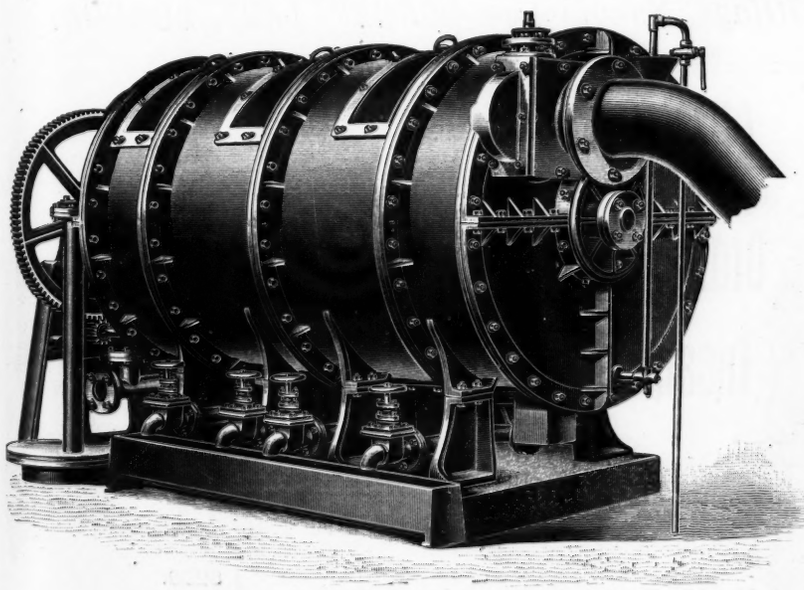

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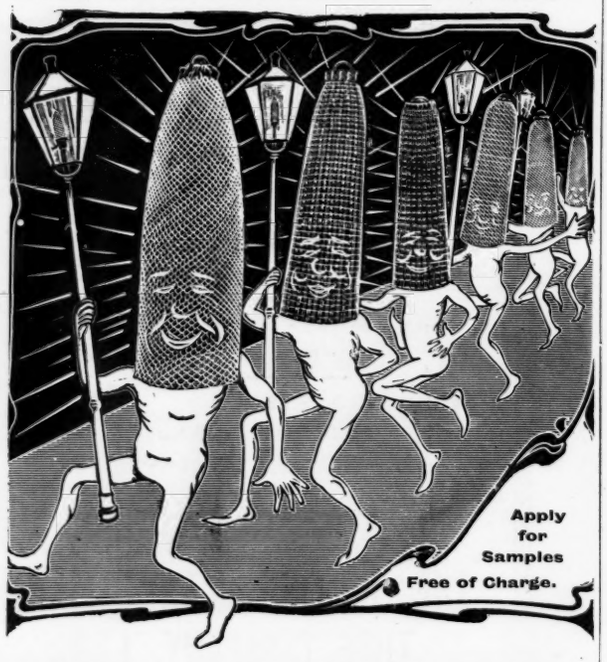

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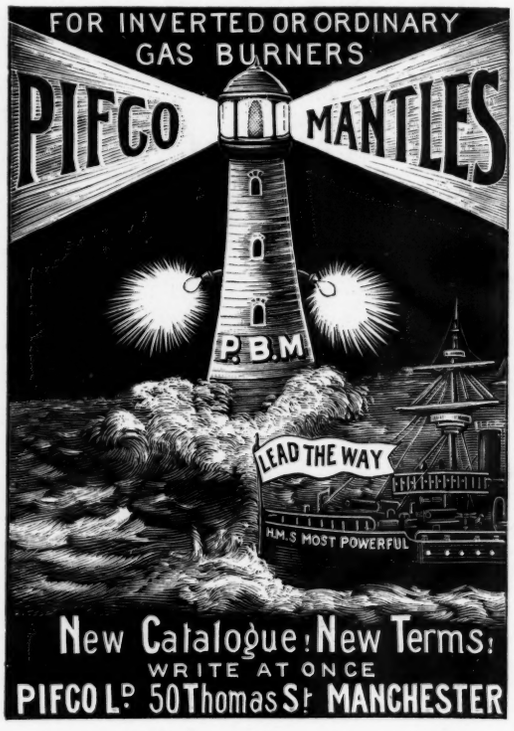

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